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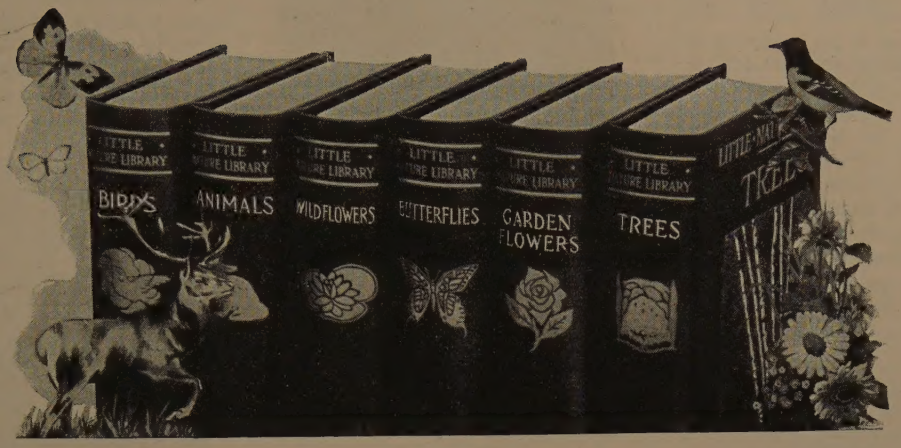

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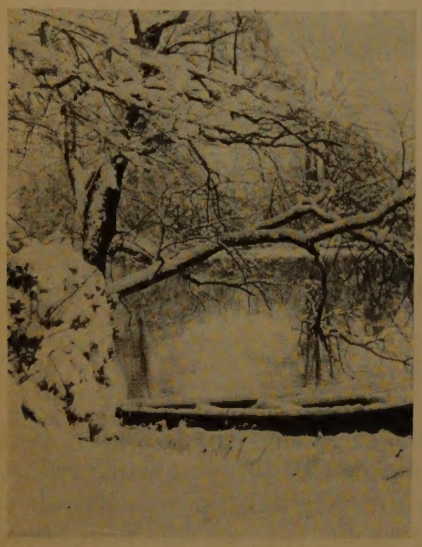
HITTING THE NATURE-PICTURE TRAIL

BY HOWARD T. MIDDLETON

While hitting the Nature-picture trail, with the chance of a worthwhile snapshot ever around the next bend, is an occasion to think about outdoor photography in general, and a few fascinating departments in particular. Therefore, let us in fancy tramp together this delightful road.

The average camerist, at the beginning of his career, has his mind set upon picture material showing a wealth of detail, taken at the correct angle with the sun at his back and at exactly the right speed and aperture. This is the sort of thing he has been taught to do, and his work is splendid as far as it goes. But let us throw detail overboard and discuss silhouettes for a moment. These picturesque shadow photographs, procured through the medium of short exposure with camera pointed toward (but not at) the sun, can be so taken as



THE CAREFULLY-PLANNED AND TAKEN SCENIC MAY BE LOVELY BUT ALSO MONOTONOUS

to produce strikingly beautiful effects. It is quite possible to produce silhouettes when the light is inadequate for ordinary snapshot photography, so leave a final film for the homeward journey at the close of day. When opportunity looms suddenly upon a hill-top against the sunset sky, you are ready, and, perhaps, this last picture, the easiest to get of the whole day's bag, will prove the finest.

Beautiful landscapes and marines closely resembling true moonlight photographs, but surpassing in detail and splendor any picture taken at night, may be easily procured in early morning or late afternoon by making a brief exposure directly at the sun when it is partially veiled by clouds. If a view is chosen showing a stretch of water with dancing and reflecting waves, the result is sure to be spectacular. When operating a short-focus hand camera, the sun (masquerading as the moon) will appear quite small in the negative, but with a long-focus instrument equipped with convertible lens, the extension of the bellows and use of a single lens element, will produce a telephoto image twice the size of the one procured in the usual way. It thus

IT WAS THE LIGHTING EFFECT THAT WON A PRIZE IN A NATIONAL CONTEST FOR THIS ONE

becomes simply a matter of camera adjustment to make the "moon" large or small as it appears to the eyes of the individual observer. This applies, of course, to actual moonlight pictures as well as to moonlight effects.

Suppose we pivot our camera now upon its tripod, turning its face away from the sun, in an arc of forty-five degrees or more, and another artistic lighting effect will come to us. The afternoon sunshine strikes diagonally across the lens instead of directly toward it and throws delicate highlights upon both subject and background in such a manner as to add materially to the artistic value of the picture. The portrait of the flycatcher at nesting hole was so taken, and it was the *lighting effect* that won it a contest prize.

While discussing light conditions, it will be well to remember that dark corners, be they indoors or out, can be brightened for portraiture by the use of a mirror of glass or polished metal, which throws the rays of the sun upon the object to be photographed. A sheet of tin two feet square that can be rolled into a cylinder for handy transportation is ideal for such work.

An abrupt turn in the Nature-picture trail may bring us to the photography of game birds in action. Here is a sport attended by all the thrills of shotgun fire but without the remorse that must sooner or later fall mercilessly upon the head of him who

SILHOUETTES ARE INTERESTING FOR VARIETY FROM THE USUAL. THIS IS A STALKING HOUSE CAT

kills for fun. The ideal hunting instrument is of the high-speed reflecting type with enclosed mirror upon which the image appears full size and right side up until the very instant of exposure. With such an outfit at his command, the camera sportsman can stalk and flush his quarry, "shooting" it on the fly just as he would do were he using a firearm.

A truly novel opportunity, available to the camera sportsman alone, is that of "scoring a double" on the same bird; first, at rest by careful stalking; second, a lightning change of film in ambush; third, the forward step that sends the quarry hurtling into the air—then the wing-"shot". There are

SHOT TOO SOON. THE CAMERA WAS SNAPPED BEFORE THE THIRD BIRD GOT OUT FROM BEHIND A SAPLING

thrills a-plenty here, I warrant you, and the game still lives! Can you ask more of any sport than this!

Buck fever, that dreaded malady of the nervous sportsman, is prevalent among the followers of the camera chase as well. I remember only too clearly the many instances in which I allowed a spectacular action portrait to escape me because I was too flabbergasted to "shoot" at the photo-

IT LOOKS LIKE A PHOTOGRAPHY CLASS IN SESSION WITH THE PARENT BIRD READING THE RIOT ACT

graphic moment. A case in point is illustrated by the picture of the flying black mallard. Had I held my "fire" for another instant, the duck would have passed from behind the intrusive sapling and saved the picture.

Just a word about the very important matter of focus. The quickest method of training the eye to be a good judge of distance, when using a hand camera equipped with focusing scale, is first to measure your stride, then pace off the distance between the object to be photographed and the lens, then endeavor to fix the distance in your mind as you focus the camera. By trying out this method of finding correct focus for a little while in rehearsal before wasting film

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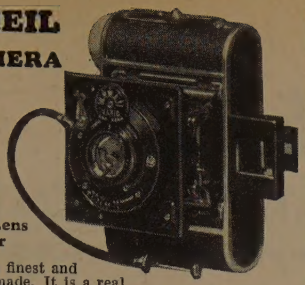

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on uncertainties, you will be surprised how soon your eye will learn to pick up the various distances that lie between six feet and one hundred feet (infinity) with sufficient accuracy to make sharp pictures almost a certainty. On bright days when you can "stop down" the lens a bit, thus increasing depth of focus, you will still further reduce the hazard of "soft" fuzzy images. Speed film will also aid you in this regard. It is vitally necessary that your negatives be sharp because even though they may produce fairly good prints by contact, the enlargements you are sure to want some day, will be blurred. It takes a razor-sharp negative to make a good enlargement, especially when the image is magnified several diameters. Modern focusing devices have, of course, helped solve many problems if you can afford the best equipment.

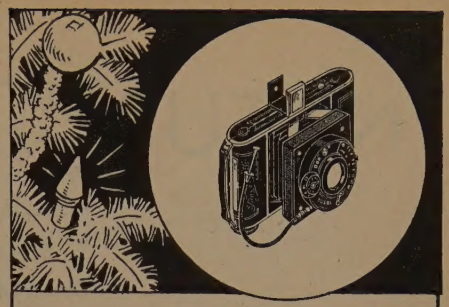
Winding down a shady hillside, homeward bound, I seem to hear again the echo of an oft-repeated question: "What type of Nature photograph is easiest to market?" And I answer conclusively, as always: "Birds!" Portrayed in attractive attitudes—in a style that is a bit different from the other fellows'—I find bird pictures to be most in demand. Mammals, reptiles, insects, wild flowers, trees, landscapes, et al., all are grist for the Nature-picture mill, however, and each variety will do its share in the winning of the photographer's daily bread, if he but present it in the best possible form to the miller, who, in this case, happens to be the editor.

On Alpine Flowers

Anyone who has known the joy of roaming the heights of our western mountains must have brought back a lasting memory of the wild flowers of these high places. To this legion, then, *Western American Alpines*, devoted to these flowers, will come as answer to an existent although not expressed desire. This volume is the work of Ira N. Gabrielson of the West Coast offices of the United States Bureau of Biological Survey. Mr. Gabrielson has roamed the western mountains for many years and thoroughly knows the wonders they hold in flora and fauna. He has transmitted his own joy in the discovery of this and that flower into this book, which serves both as an account of a study of these flowers and a volume for identification. The book is profusely illustrated in black and white. It is published by the Macmillan Company and sells for $3.50.

Tiger Man

Here is *Tiger Man*, another book of thrills and adventure by Julian Duguid, author of the popular *Green Hell*. The central character of this newest volume appeared in the earlier best seller, and, in fact, *Tiger Man* is a biography presented in novel form. It is the story of struggle with hardship and the jungle by a man who was once a hunter and who came to despise firearms. The range of Mr. Duguid's story is from a Baltic forest to a Brazilian marsh and truly this is wide enough to encompass all that this volume so admirably does. It is a fitting sequel to *Green Hell* and those who met Sacha Siemel once will wish to know more of him. The book is brought out by The Century Company and sells for three dollars.



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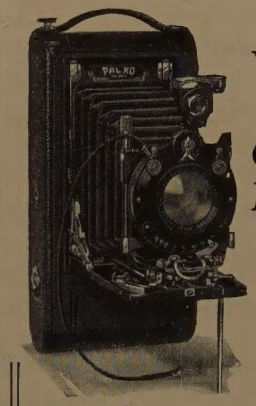

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ALASKAN BEARS

BROWN AND GRIZZLY BEARS OF ADMIRALTY ISLAND SHOULD BE PROTECTED

At its next session the Congress of the United States will be asked to establish a sanctuary for brown and grizzly bears on Admiralty Island, Alaska. This action should be taken since it would provide the only assurance in sight that these great mammals will be adequately protected.

On the other hand, Paul G. Redington, Chief of the United States Bureau of Biological Survey, has been widely, but, we trust, incorrectly, quoted this last summer in the Alaskan press to the effect that the sanctuary idea has been shelved. He is likewise credited with the statement that the Alaskan Game Commission, the Biological Survey and the Forest Service can handle the matter satisfactorily. We regret that we cannot share his confidence.

About a year ago, in these pages, we urged better protection for these bears. This stand was well-advised. It was founded upon scientific fact and intimate knowledge. Further, it reflected a recognition of a situation in which all genuinely interested in the preservation of vanishing wild life must feel concern.

During the year that has elapsed no plan has been put forward by the agencies jointly responsible that assures an equitable solution of the problem. Instead we are now confronted with the likelihood that vast areas of virgin forest in the region concerned shall be converted into pulp wood, with the coincidental certain destruction of valuable wild life. Although the Forest Service asserts an interest in wild life, it talks only in terms of wood pulp to be harvested over a period of fifty years. It is mild to state that the Alaskan Game Commission, co-guardian of this wild life, appears indifferent to its fate.

In reality we are confronted with a project of pulp-wood cutting over a period of years marching side by side with a campaign for the extermination of these great bears. No program of bear protection in neighboring areas while the small section being logged off is tenanted by the lumberman is advanced. Instead this twin project of pulp and persecution is born of a drive to exploit Alaska's resources, whatever the cost, and the slogan of the fight against the bears is fear.

Anyone who has spent any time in the open cannot but laugh at being afraid of wild animals. A few people, of course, have been killed or maimed by Alaskan bears in the last half century. With few exceptions these rare cases may be laid to poor judgment in dealing with a cornered or wounded bear. Yet these few instances have been nurtured into a cry for extermination of the Admiralty Island bears in order that the forests may be safe for the choppers of wood. Trained hunters, and, even, poison, have been urged as weapons for the valiant fight that is outlined. Shades of the long generations of Indian trappers and their families who have dwelt among these bears in their frail wilderness homes!

That peculiar human faculty of clouding fundamentals with minor and superficial details seems to have obscured the Alaskan bear issue. From a fog of discussion about the acreage of protected and unprotected area, and the bear population of this or that section, the fact that the bears are in danger rarely emerges. Just how many are left we will never know until they are all gone. Then we can count them, just as men have counted the museum specimens of the great auk and the Labrador duck.

Let us blow away this fog with the breeze of a few facts. The incomparable and irreplaceable wealth of brown and grizzly bears on Admiralty Island is valuable scenically and scientifically. It cannot be saved by scratching cross-hatched areas on a map of the mainland where there are nothing but glacier-covered and lifeless areas. It cannot be saved by lowering bag-limits or shortening the season *somewhere else*. It does not matter much today whether a dead bear is of one species or another. It *does* matter whether there shall be live bears or only bear bones on Admiralty or Chichagof Islands fifty years from now.

The bison inevitably vanished from the plains of Nebraska. The wolf necessarily disappeared from the woodlands of Massachusetts. But the mountain slopes of Admiralty Island can never be transformed into wheatfields or apple orchards, even were there economic justification for stripping them for pulp wood, and there is ample room for its wild life.

Today the great brown bears grub for roots in the spruce forest and scavenge spent salmon in the snow-fed streams. As the largest carnivores now on the earth they deserve and should have sanctuary. There is no justification in reason for shooting and poisoning them out of existence and into history. But they will be shot or poisoned unless we today bestir ourselves and let it be known in the halls of Congress and elsewhere what are our wishes and our convictions.

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WIGWAGGING IN THE WILD

THE MEANING OF THE LANGUAGE OF TAILS

BY HAMILTON M. LAING

THE MOST common example of an animal that expresses himself eloquently by the sign language of his tail is of course our best four-footed friend, the dog, that by means of the caudal bit of him makes plain almost every mental reaction of which he is capable. Other domestic animals of duller brains express themselves correspondingly. Thus the horse registers fear and pride and anger with the pose of his tail or by switching; calves in play cock them up stiffly, and even phlegmatic old Bossy when stabled shows pleasure and appreciation under a curry-comb by elevating her fly-swatter and curling it comically. That we do not know much of this form of sign language among the creatures of the wild, is due mainly to the fact that we are not really intimate with wild things. Usually the latter are so afraid of man that they express but this one emotion at the time seen.

CHIPMUNKS WIGWAG OVER THEIR FOOD

Here are two of the busy little fellows, the diner at the right with tail down, the other waving aloft

That wild creatures talk with their tails is an old story. The white-tailed deer that throws down his defiant white flag when hurt, is knowledge handed to us from our pioneer forefathers. But there is vastly more to the story than that. In short, Reynard's great brush or the coyote's furry train is more than just a wrap when he is curled up in the snow or a steering rudder when he is running or dodging for his life. "Flicker-tail", the prairie ground squirrel, does not flip his tail about so for mere fun or exercise. Tail action nearly always has a meaning; the use of this member in signalling is a language of a crude sort and plays a considerable part in the life of the owner.

The principle of the thing is merely an application of the saying that actions are more eloquent than words. The voices of most four-footed creatures are but poorly developed and of little use in expression. It is to the advantage of most animals to be silent. Birds in company are loquacious; four-footed folk on the contrary are usually very quiet. Thus it is that every creature watches every other of his kind near him and interprets every action.

For example, watch the little company of white mountain sheep feeding in their craggy home—good subjects, as with binoculars we can observe them at a mile. Now an old ewe raises her head and fixes her gaze on a point down the slope. Instantly almost every head in the company comes up and focuses likewise. Down goes the leader's head—down go the others'. All's well. Or perhaps they are lying on a craggy brow chewing the ruminative cud, when the leader suddenly fixes her gaze and rises to her feet. Instantly every jaw ceases its wagging and every member of the company comes to attention. Actions eloquent; the leader controlling the flock without a sound uttered.

But sheep do not talk to any considerable extent with their tails. It is in the deer family we find the eloquent tail-waggers with a semaphore code that plays a large

GOLDEN-MANTLED GROUND SQUIRREL WIG-WAGGING

He flirts his tail both while feeding and to show interest and attention

part in their lives. In their signalling, the elk and our smaller deer—white-tailed, black-tailed and mule—all are aided by white stern-patches that in conjunction with an elevated tail shine like a beacon. In fact in the case of the elk—and also of the antelope of the plains—this white patch, by means of sudden erection of the hair, can be made to bloom out wondrously—a danger and communication signal to be seen afar. The smaller deer however have a much more extensive code than this and communicate a great deal of news by means of the tail itself.

Nearly all sign language of this sort has to do with one topic—danger. Wild things live in a world of peril; almost every moment of their lives they are on the watch for a foe of some sort. It is but natural then that their silent language has to do with warnings. If we look through the whole list of our commoner long-tailed mammals from the small rodent to the short-tailed deer we will find that nearly all their tail messages may be interpreted as "Danger! Watch out for yourself!" Few indeed can go farther than this.

Not all our long-tailed animals have eloquent tails. It is very difficult to see how a white-footed mouse or jumping mouse, a house rat or porcupine can tell much of a story in this manner. But there is no telling; for even the brainless muskrat has a way of curling up his tail above the surface of the water in a pose that doubtless spells out some message to his kind. It is conceivable that Porky can use his terrible weapon as other than a spiny club, for the equally stiff-tailed beaver has a way when ashore of elevating his tail a bit—instead of dragging it in the usual manner—as though the pose might be a signal to brother worker.

There is another form of tail signal that in some few creatures has another meaning: a warning to a foe to beware. It is very well exemplified in the sudden fluffing of the appendage of the house cat, and when it is linked to an arched back and blazing eyes, it is exceedingly eloquent of "Touch me at your peril." The lynx and bobcat are less expressive with their bobbed tails but the big cougar when full of fear or anger, as when treed by dogs, wriggles the end of his snaky appendage in that way of all the big cats. Another chap more commonly observed to flash the same message from elevated, expanded tail is the skunk. When he emphasizes the signal by patting the ground with his front paws, it is time to accept the wording at face value and back up out of there! All such actions in these animals are used against any foe, whether of their own kind or any other.

The reverse of this, an expression of good will, may be noted in the coyote and gray wolf. A wolf in captivity has been seen to curl up his tail dog fashion on the occasion of a pleasant, nose-to-nose meeting with one of

TALKING WITH THEIR TAILS SEEMS INSTINCTIVE WITH MOST ANIMALS

This hand-raised, three-months-old black-tail deer fawn used his flag exactly as do parents he never knew

SEMAPHORE OF THE WHITE-TAILED DEER IN ACTION

At left the tail erect in escape, center waving to say, "Danger." Right, "All's Well"

his kind—a pleased-to-meet-you expression of amiability. Also the coyote has been noted to wag much after the manner of the dog. The writer once watched the coming together at sunset of a junto of five coyotes, almost certainly mother and grown young. There was a sort of grinning, nose-rubbing, tail wagging ceremony, the tails evidently expressing good fellowship just as those of dogs would do when a canine meeting is held.

The constant flicking and flirting of the tail in the case of many of the smaller rodents, such as red squirrel, chipmunk and the various ground squirrels, is rather a wonderful thing and will bear much study. One thing is certain: such pronounced actions, characteristic of the group, are not aimless—mere expenditure of surplus energy. They have a part to play in the lives of these little creatures, and it may be no small part.

It is noticeable in the case of chipmunk and red squirrel that while feeding on something of which they are fond, the tail is very liable to be elevated in the pose of huge satisfaction—a drooping or dragging tail seeming somehow to spell the reverse. As such creatures are all considerably gregarious, who can say that this high pose of the caudal semaphore is not the natural sign of one to another, interpreted in short as "I have found good grub?" The ground squirrels are even more gregarious animals, but they are surrounded by their food—herbage—and there is no point at all to such a message among them, and it is noteworthy that ground squirrels do not flirt their tails over food as much as over other causes.

The red squirrel of course is one of the most expressive of creatures and his wondrous brush is a part of the ensemble in every pose, but it is difficult to tell how much intelligence is flashed by this means between individuals.

The ground squirrels again being creatures of the open are greatly given to wigwagging messages. Of the various western ground squirrels, too well known in the wheat lands, the Richardson's thus has earned the name of "flicker-tail". On sighting danger, he gives his lean tail a comical wiggling flip; it is his last act as he goes below and his first on emerging. Almost every move, every interest and change of mind, is accompanied by a tail flicker.

This signal undoubtedly is a sort of broadcast to be read by all and sundry meaning, "Attention. Be on the alert", but also it conveys another message. It serves to catch the eye of every neighbor and thus tell where every member of the company is located. It is doubtless quite exactly the parallel to the strange flirting of the tail among birds such as juncos, towhees and song sparrows. Birds of solitary habit have no such tail action. Neither do solitary mammals.

THE FRANKLIN'S GROUND SQUIRREL AT ALERT

He is not expressive with his tail but when angry he fluffs it fully exactly as does the battling cat

BIRDS ALSO ARE EXPRESSIVE WITH TAIL FEATHERS

Such birds as juncos, towhees and song sparrows flick their tails emphatically, much as do mammals

In order to see the real significance of messages such as those flashed by Flicker-tail, we must bear in mind that few mammals have really good eyes—that is, keen vision. The coyote, antelope and mountain sheep have excellent vision but the great majority of other four-footed folk seem quick with the eye only in detecting movement. They catch motion quite unfailingly, yet have little sharpness in distinguishing details—none of the telescopic eye-quality of many birds. Thus it is that the semaphore language of the tail means so much to them. Flicker-tail's bodily action in sitting erect, crouching, dashing for the burrow, etc., coupled with his warning tail tells to his neighbor a great deal more than could be told in words. Indeed it tells the whole story.

Before leaving the ground squirrels it must be told that though they are generally less expressive than chipmunk or red squirrel they may be seen to use the tail for purpose of intimidation exactly as the cat does. For years the writer made friends with Franklin's ground squirrel in a Manitoba camp and it was a daily sight to see two of these greedy fellows engage in battle over camp scraps, and always as a preliminary to the actual tussle the tail was fluffed and expanded hugely—the same Touch-me-if-you-dare threat displayed by belligerent Puss. Undoubtedly the other ground squirrels express their threats of violence in the same manner.

What has been said of the ground squirrel applies almost equally to the ground hog family. The yellow-bellied marmot has a way of working his tail comically; so has the hoary marmot or whistler that telegraphs in advance almost every action by a flirt of his tail—action that is meaningless, till we see it in the light of a message to his kind.

But significant as are all such actions when we know the code, it can be shown that of all our creatures the white-tailed deer has the system of wigwagging most completely developed. The commonest signal we see from the deer is the all's-well sign, consisting of a sudden little lateral waggle of the tail. The writer one day watched a mule deer doe leading her fawn and last year's spiker up a draw. The wary old mother caught sight of the human figure seated on the slope above and paused instantly with high head and "bored in" with her eyes. The others did the same. By and by, because there was no movement, the doe lowered her head, gave her tail a comical wiggle and started forward. At which the fawn gave his tail exactly the same twiddle and stepped off, to be followed by the spiker in the same manner. The action was all so plain, meaning "All's well ahead", that there could be no doubt. The tail-twiddle sign given by a deer before he begins to move is a thing known to almost every hunter.

SHEEP OF THE MOUNTAINS

When the leader fixes her gaze and rises to her feet, instantly every member of the company comes to attention, the leader controlling the flock without a sound uttered

But the white-tail goes far beyond this and by means of his great snowy flag flashes several distinct messages. A feeding white-tail on becoming suddenly certain that an intruder, possibly dangerous, is at hand, simply "freezes" and erects the tail stiffly, holding it there. Convinced now that flight is advisable he runs off waving his flag easily from side to side. If shot at or otherwise scared, he holds his white flare stiffly erect as he puts distance behind him. This last is the "Save yourself!" message so often read by hunters. The tail-down signal as mentioned earlier signifies "I'm hurt!" This use of the white flag may be best seen in the case of a nervous old doe leading her fawns—tail language whose wonders of communication can be merely suggested here.

This tail talk does not have to be learned. The knowledge is born with the young. Which really opens up a vista into Nature's ways even more wonderful still.

WEATHER TOYS

SUNDRY DEVICES NOT USED BY THE WEATHER BUREAU

BY
CHARLES FITZHUGH TALMAN

A GERMAN WEATHER HOUSE

Whence the goings and the comings are supposed to give the observer an idea of what weather is in store for the morrow's picnic

TOYS, as a rule, are playthings for children, but weather toys are an exception. Instead of being found in the nursery, they are mostly installed in the domestic sitting room or on the side porch, where they are often consulted by grown-ups, many of whom take their indications much too seriously. There may be matter for moralizing in the fact that these quite unscientific and untrustworthy contrivances are boldly offered for sale by opticians, in whose windows you see them displayed side by side with authentic barometers and thermometers. Some can also be bought at the ten-cent stores, and some—along with alarm-clocks and ham sandwiches—at so-called drugstores.

The story of weather toys properly begins with the most familiar of them all, of which the poet Cowper wrote:

Peace to the artist whose ingenious thought
Devised the weather house, that useful toy!
Fearless of humid air and gathering rains,
Forth steps the man—the emblem of myself!
More delicate, his timorous mate retires * * *

Such were the habits of Jocky and Jenny—as the little people of the weather house are called in England—at the time the above lines were written, and such they generally are today; but originally the man was a hunter, who carried a gun over his shoulder and came forth when the air was growing *dry,* while his fair companion, umbrella in hand, was supposed to emerge when dampness and showers were in prospect. The device in this form appears to have been first constructed about 1720 by Jacob Leupold, of Leipzig, the inventor of several other curious contraptions, including one that emitted musical notes to announce the force and direction of the wind. In a weather house of recent Swiss construction the prophet of showers is an old witch; the task of fair weather prediction being assigned to Hänsel and Gretel, safely out of her reach at the opposite end of the swinging platform on which the figures stand.

COURTESY THE AEROLOGIST

"HAROLD THE LIFEGUARD"

Moist air spreads his legs apart and dry draws them together. Believe it or not!

Anybody of an investigative turn will have discovered that this platform is suspended from a string of stranded catgut. The latter substance is one of many that absorb moisture when the humidity of the air is high and lose moisture when it is low—conditions that we often describe by saying that the air is "moist" or "dry", respectively, though it is really a question of the amount of water vapor present, and this vapor is not perceptible to our senses.

Like most other stranded cords and ropes, the catgut string shortens in ab-

THE "PARISIAN BAROMETER"

The little lady's skirt changes color with the changes in the weather

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DUTCH WEATHER GLASS

The rise and fall of the colored liquid in the spout is the indication of change

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MOUNTAINEERS' BAROMETER

From the Vosges Mountains. The curvature of the twig shows atmospheric changes

sorbing moisture and lengthens in drying out, and at the same time the screw-like action of the twisted strands causes it to turn in one direction or the other, carrying the platform around with it. This contrivance is, therefore, merely a crude hygroscope, which gives us a rough idea of the extent to which the air is charged with invisible water vapor. Its use as a weather prognosticator assumes that an increase in atmospheric moisture points to the probability of rain and a decrease to the likelihood of a dry spell—but this is a rule to which there are many exceptions. The meteorologist has far more accurate instruments for measuring humidity, but would not think of depending on one of them in making a weather forecast.

Several other weather toys work on much the same principle as the weather house. These include the soldier who enters and quits his sentry-box with changes in the state of the air, the fox that executes similar movements at the mouth of his den, the cat that is seen in the attitude of washing her face when the air grows damp (in accordance with the popular notion that real cats do likewise before a shower), and the monk whose hinged cowl covers his head to give warning of rain and falls back to promise fair weather.

Such devices are operated in some cases by the twisting of a catgut string, in others by its change in length; and there are still other toys of this class in which the string is replaced by a bit of vegetable material that warps into various shapes—just as book covers and furniture are inclined to do—with variations in atmospheric moisture. The awn or beard of an oat is sometimes employed for this purpose. The National Museum, in Washington, possesses a quaint plaster mannikin that lifts an umbrella above its head in a moist atmosphere. In this toy the long beak-like seed of a geranium, coiled around a pin, serves as the operating mechanism.

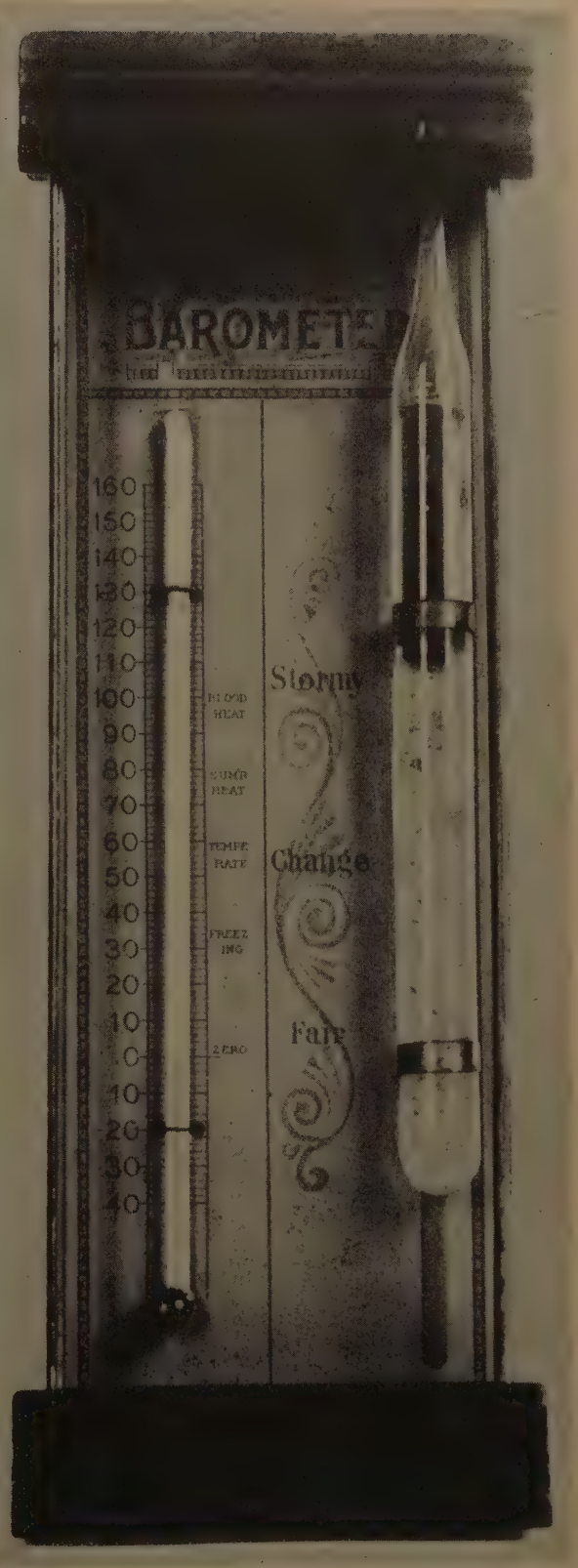
Twigs that change in curvature with changes of humidity are utilized in some of the weather toys made by rustic artisans in Europe. Generally one end of the twig is fastened to a frame and the other is free to move over a scale marked with a series of terms descriptive of coming weather, in imitation of those often found on barometers. The name "barometer" is, moreover, popularly applied to these homely hygroscopes, as well as to most other weather toys to which prophetic powers are ascribed, regardless of the fact that this name means literally a "measure of weight" and is therefore more accurately descriptive of a pair

of scales for weighing groceries than for any contrivance, scientific or otherwise, for indicating the amount of moisture in the air!

The real barometer does, of course, weigh the air, and when used with discretion affords some clue to approaching weather changes, though the inscriptions, "Rain," "Stormy," "Fair," etc., once almost universally placed on its scale are so misleading that they are no longer put on instruments intended for strictly scientific use. Among the weather toys there is, I believe, only one that depends for its operation upon variations in the weight of the atmosphere and is, therefore, truly a barometer, though a poor one. It has generally been called the "Dutch weather glass," but has lately appeared in American shops under the name of the "clipper-ship weather glass."

This device consists of an oval glass receptacle with a slender glass spout issuing from near its base and extending vertically upward, so that the whole thing has the general shape of a teapot. The upper end of the spout is open but the receptacle is airtight. The glass is partly filled with colored water, and changes in atmospheric pressure cause the liquid to rise and fall in the spout, which is sometimes etched with a scale and thus corresponds to the tube of an ordinary mercurial barometer. Its indications are, however, the reverse of those of ordinary barometers, as a fall of its liquid column points, in a general way, to fair weather and a rise to stormy weather.

Unfortunately for the accuracy of this contrivance, the confined air in the receptacle expands and contracts with changes of temperature, and this affects the height



THE CAMPHOR BAROMETER

Once very common, but now almost rare enough for the antique shops. The large tube at the right is the essential feature; the thermometer is incidental

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BAVARIAN PEASANTS' BAROMETER

Here again the protruding arm gives the tiller of the soil and the reaper of the crops what he regards as a satisfactory prediction of coming changes in the weather

of the water in the spout. An old-fashioned scientific instrument called the "sympiesometer" works in much the same way as the Dutch weather glass, but it has an attachment for adjusting its scale so as to make allowance for the effects of temperature.

Returning, now, to the toy hygroscopes, there is a large and interesting class of these devices in which varying moisture, instead of acting mechanically to cause movements, produces a change of color through chemical action. These chemical hygroscopes first appeared about sixty years ago and have been made in a great variety of forms. The sensitive part usually consists of paper treated with a strong solution of chloride of cobalt, to which is added a certain amount of sodium chloride and gum arabic. It is blue when dry, but changes gradually toward pink with increasing humidity. Sometimes the hygroscopic portion represents a flower, sometimes a woman's skirt, sometimes a chameleon, and so on.

THE WEATHER CAPUCHIN
He puts on his hood when the air is damp and doffs it when the air is dry

In the "chameleon barometer" a picture of the creature proverbial for its fickle hue changes color with the weather, and there is an adjacent scale of permanent colors for comparison.

A toy quite different in appearance and operation from any of those already mentioned is the "camphor barometer"—otherwise known as the "camphor glass," "storm glass," or "paroscope"—once widely sold in American shops and also given away for advertising purposes, but now rather scarce. It consists of a glass vial nearly filled with a solution of camphor and other substances in alcohol. The liquid is sometimes colored with a little aniline or logwood. Air fills the upper part of the vial, the mouth of which is hermetically sealed. The device is mounted vertically on a wooden frame, which usually also carries a thermometer.

The liquid is sometimes more or less flaky-looking and at other times clear, and changes in its appearance are supposed to prognosticate changes in the weather. The appearance of the liquid actually depends on the temperature, so that this device is merely a poor thermoscope and it has no real value as a weather prognosticator. The camphor barometer is supposed to have been invented about the middle of the eighteenth century, but the name of its inventor is unknown. Its fame was much enhanced by the interest taken in it, some seventy years ago, by Admiral Robert FitzRoy, the first head of the official meteorological service in Great Britain. FitzRoy, who was a somewhat crotchety genius without much scientific training, discovered imaginary virtues in this deceitful instrument, to which a chapter is devoted in his once well-known "Weather Book."

No account of weather toys would be complete without some mention of those in which a living creature serves as the prophet of showers and sunshine. The most familiar one is a glass jar, half full of water, containing a tree-frog (*Hyla*). The prophet is provided with a little ladder on which he can climb partly or entirely out of the water, and his movements are supposed to predict the weather—though opinions differ as to whether he climbs up before fair weather and down before rain, or just the opposite. A picture of this household Weather Bureau was published in NATURE MAGAZINE for November, 1926. A leech in a jar of water is another weather prophet of popular renown, and there are several fantastic rules for interpreting the meteorological significance of his various movements and postures.

The most reliable weather toy I know of is one called the "donkey barometer," which was described in a recent number of the journal *Industrial Arts and Vocational Education*, published in Milwaukee. If suitably exposed to the elements out-of-doors, it is hard to see how this marvelous contrivance could ever go wrong. It consists of a card, on which is the silhouette figure of a donkey, to whose posterior extremity is attached a piece of stiff cord by way of tail. The cord stands vertically and is free to wave in the breeze if there is any. At the bottom of the card we read:

If tail is dry—FAIR
If tail is wet—RAIN
If tail moves—WINDY
If tail is frozen—COLD
If tail is white—SNOW
If tail is hidden—FOG

Believe it or not, the donkey tells you with uncanny accuracy just what the weather is doing, or has recently been doing, at the time you consult him. Being a wise donkey, he does not attempt to predict the future.

LARVAE OF THE BLACK FLIES ATTACHED TO THEIR UNDER-WATER ROCKS

With their little fans of stiff bristles outstretched they strain from the passing water the minute organisms and diatoms and make a hearty meal from their catch

FISHERMEN OF THE BROOK

INSECT IZAAK WALTONS THAT KNOW MAN'S FISHING TRICKS

BY S. W. FROST

MANY are the stories the brook or stream could tell. Perhaps it would be of the fate of some rare and unsuspecting insect lapped up by a watchful frog; or of the locust or the bee that, faltering on the wing, made a meal for some loitering trout. But the brook flows quietly and steadily onward, its secrets its own, leaving it for man to seek them out in all their drama and their fascination.

Truly there is drama, and art and artifice, along the stream. There dwell myriad insects living upon small plants and organisms, on their smaller fellows, or on what fate or fortune may offer for their meals. And among these dwellers by and in the brook are those whose ways of fishing rival the means and methods of man; surpass them in invention and ingenuity.

PUPA OF THE BLACK FLY

As shown here it is enlarged six times its natural size

Those of us who dwell along the briny coast have seen men gathering oysters. We have seen them scour the bottom of bay or inlet with long rakes, tonging thus for the bivalves that delight the epicure.

But go to a stream of cool, swiftly-running water, where the swiftest current sweeps over submerged stones. Spy out some black, velvety patches on these stones and study them carefully. You will discover that these are peculiar insects, attached to the rock, but with their free ends reaching up into the water with two outstretched, fan-like structures. Built of fine stiff bristles, these serve as strainers every bit as efficient as the oyster tongs of man.

Swiftly the water passes through these fans, the small organisms that live in the water being strained out. When these diminutive rakes have gathered enough for a meal —or for at least one course—they are brought together by a muscular motion. Then the catch of algae or of diatoms is transferred to the mouth of the creature, this being conveniently situated just back of the catching apparatus, and the meal goes to nourish this brook fisherman.

You will wonder what these fishermen are and how they got to their under-water fishing ground. They are the larvae or young of the pestiferous black flies that are often common in the woods to the confusion and annoyance of fisherman and camper. The flies have laid their eggs in the rapids of streams—most often at the edge of the rippling water. From the eggs have hatched small, black larvae about one quarter of an inch long. These have attached themselves to the rocks by means of a sucker, and there they are anchored, drawing air from the moving,

PESTIFEROUS BLACK FLY

Bane of hunter and camper, looks like this although the enlargement is six times

CADDICE FLY LAYING HER EGGS

She selects places on stones or twigs near streams, where the eggs hatch and enter the water

aerated water and fishing busily. When these larvae have reached full growth they spin cocoons beneath the water, breathing then through gills that open at the upper end of the cocoons. Emerging from these resting places, the flies rise rapidly to the surface and start out for a meal on man or beast. To be sure, in these early stages many have provided a tid-bit for fishes, so, after all, they have their value.

Man also is wont to fish with nets, catching up the salmon, or the shad, or other fishes as they run the streams to spawn, or travel in schools about the open waters. No less clever with the fishing net are the small insects known as caddice-worms or caddice flies. They, too, construct nets: webs more delicate and more beautiful than man can devise.

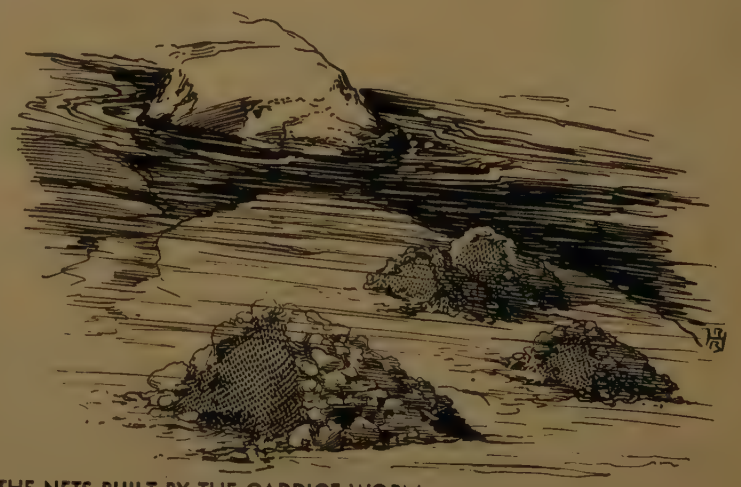
Caddice flies are abundant about streams and wet places, and are frequently attracted to lights at night. They are clumsy fliers and are easy to recognize when at rest because they resemble small moths, except that they are clothed with hairs instead of scales. They fold their wings over the body like a roof, generally holding their long feelers out in front of them.

There are many different kinds of caddice flies. Most of the larvae build portable cases or houses of stones, sticks, moss or other material in which they live, dragging these cases wherever they go. Not all caddice-worms are fishermen, but a few make beautiful nets under the water. These are known by the magnificent name, "Hydropsyche", meaning the beautiful winged individuals of the water. They are the great fishermen of the insect world, stringing their nets in profusion in moderate to swiftly flowing streams. One is sure to find these nets during June or July by turning over a few stones in almost any stream. Often they are covered with dirt or mud and may be overlooked unless one searches carefully. Remember, however, that they are small insects usually no more than a half inch long and their flimsy nets are correspondingly small.

Psyche, if we may call her by that name, is a little larva that lives in a silken tube fastened permanently to a stone or to some material on the bottom of the stream. She weaves a funnel-like net with the opening pointing upstream. The algae and other abundant small organisms are strained out as the water passes through the net. Psyche makes frequent inspections of her net much as a spider examines her web. An abundant supply of food is thus obtained upon which Psyche feeds greedily. When full grown she incloses herself in a case composed of sand or small stones and, like a butterfly, changes to a full grown, winged caddice fly. She then emerges from the water and spends a short time flying about, after which she lays her eggs upon stones or twigs adjacent to the stream. These eventually hatch and enter the water to imitate their parent.

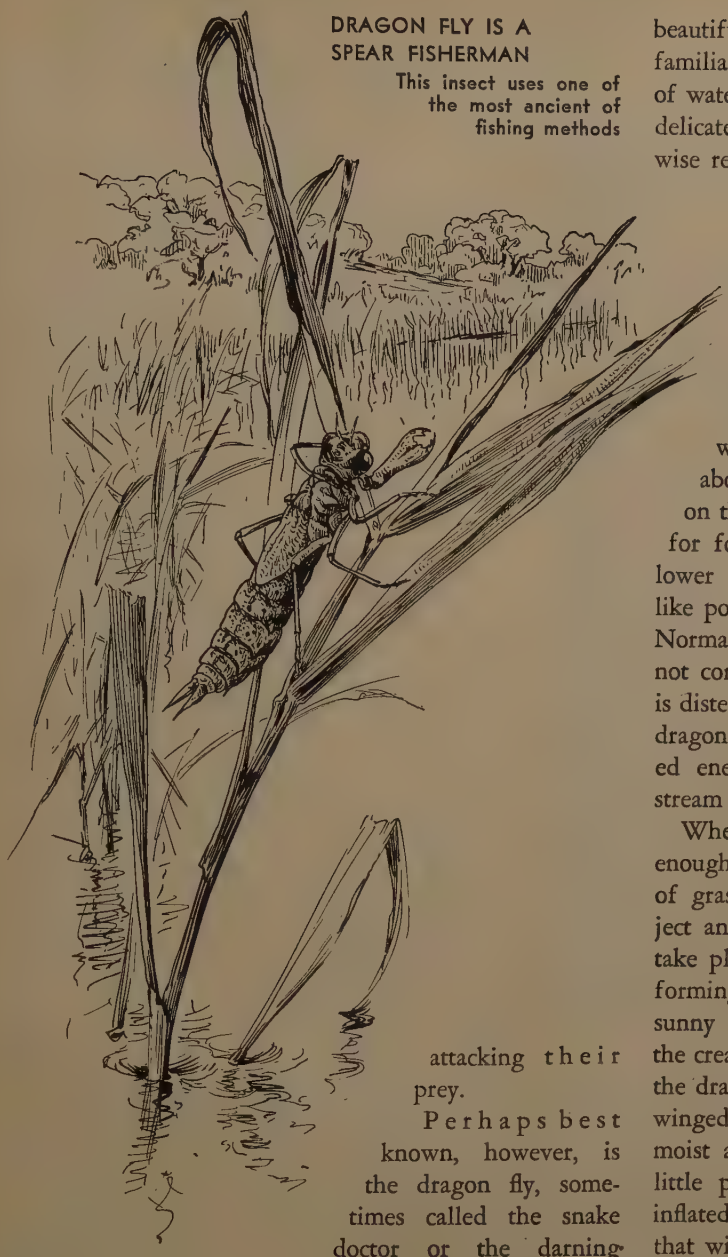
Perhaps man's most ancient method of catching both fish and game was with the spear. It, together with the bow and arrow, secured a fish diet for primitive man and assured no small part of his food. But the stalking and striking of prey belongs not alone to man. Insects, long before man appeared, had developed spears. Their spears were not tools accessory to the insect but a part of the insect itself, thus making the story more interesting and more amazing. The mouth or fore limbs of certain insects have been modified into efficient organs for striking and obtaining their prey.

Among these spear fishermen are the water striders, familiar creatures that seem to skip over the surface of sluggish water without touching it, and the water boatmen that dive beneath the water or rise to the surface with their middle feet outstretched and resemble in appearance an oarsman feathering the water with his oars. They have spear-like mouths with which they pierce and suck the juice of their prey. The giant water bug, the classical kissing bug, and the obnoxious bed bug, all have well-developed spears that are efficient tools in



THE NETS BUILT BY THE CADDICE WORM

The little huts are built with the webs for straining the water facing upstream, and thus abundant food is obtained



DRAGON FLY IS A SPEAR FISHERMAN

This insect uses one of the most ancient of fishing methods

attacking their prey.

Perhaps best known, however, is the dragon fly, sometimes called the snake doctor or the darning needle. As ferocious as the names may seem, these insects are harmless to man. The adults are powerful, swift fliers, and usually difficult to catch. They dart over the surface of the water seeming to attend to their own business. The dragon flies with their beautiful glassy wings, their long pointed abdomen, great rounded eyes, beautiful color markings and powerful darting flights are familiar sights to any who visit streams or small bodies of water. Their close cousins, the damsel flies, are more delicate in structure and more lazy in flight, but otherwise resemble the dragon flies.

The mother dragon fly lays her eggs in or about the water. Some of the species, as they dart over the water, descend, touching it with a rapidity that is difficult to follow with the eye, each time depositing an egg upon the surface of the water. These eggs hatch into creatures far different and much less active than their parents. They are short, flattened creatures without wings and with a hard shell. They crawl about in the mud, on submerged plants and leaves on the bottom of the stream in quest of small insects for food. Their head is provided with an elongated lower lip terminated by two spear-like points used to secure their prey. Normally this structure is folded and not conspicuous, but when in use it is distended to its full length and the dragon fly nymph becomes the dreaded enemy of small insects on the stream bottom.

JAW OF THE DRAGON FLY NYMPH

Showing spear-like lip and mouth parts extended

When these nymphs have secured enough food, they crawl up a stem of grass or some perpendicular object and there wait for a change to take place not unlike a worm transforming to a butterfly. Finally, some sunny morning, the shell inclosing the creature splits along the back and the dragon fly emerges as a beautiful winged insect. At first the wings are moist and folded on the back, like little pads, but soon these become inflated and expand into glassy wings that will carry them swiftly about their life's activities.

Hereafter when we wade a stream knee deep casting for a strike, or watch an old timer haul in his catch of shad or salmon, we will remember the tiny creatures which are just a few of the insects that learned the art of fishing long before man worked it out for himself. Perhaps, indeed, man first got his ideas from them.

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??? . . . AN IMPORTANT QUESTION . . . ???

May we have your helpful advice? With this issue Nature Magazine concludes the first ten years of its life. The question of a ten-year index has arisen. While each volume has been indexed a number of our readers have asked for a composite index. We have no way of knowing, of course, how many individuals and organizations have preserved Nature Magazine for the entire ten years or a major part of that period. We can and will, however, get up a ten-year index if there is a demand for it. We would have to sell this at cost and we estimate this cost as between fifty and seventy-five cents. You can help us by dropping the editor a postal card or a note saying that you would be interested in such an index. This would not, of course, obligate you but would give us an idea of the need for performing this somewhat arduous task. Thank You.

SECRETS OF HUNTING WITH A CAMERA

BY ARTHUR NEWTON PACK

In this article Mr. Pack, whose past experiences in taking pictures of wild game have been frequently described by him for the readers of Nature Magazine, tells us about the planning of a camera hunting trip, the kind of equipment he has found most satisfactory, and his methods of carrying this equipment on a two-hundred-mile pack trip. The accompanying photographs were made by Mr. and Mrs. Pack this past summer in Alberta and British Columbia on a thirty-day trip starting from Jasper Park.

"NEXT year perhaps we can take horses and go into the country north of Jasper Park!"

There it is—a whole splendid idea, awaking visions of great gaunt peaks glistening with snow, of mountain meadows sprinkled with brilliant blossoms, of curious caribou, of huge horned rams, of slanting sunlight on tiny tents lost in the vastness of the beyond.

"Yes—let's!"

Always anticipation is like that. The wheels that bear us home from our last trip have not ceased their grinding. Ahead are yet ten months of fall and winter and spring, and then—well, anyhow, there is no law against making plans for the next camera hunt. No law indeed. How well we remember our first pack trip, before we learned how to plan. Those were bitter disappointments, with unsuitable cameras, light-struck films, smashed equipment, awkward arrangements.

BABY PTARMIGAN POSES AT AN EARLY AGE

One of the incidental records of wild friends encountered in the course of an expedition

The great problem of the camera hunter is the selection of just the right camera or cameras. He must be able to take a satisfactory picture of big game at a distance of a hundred yards or thirty feet, or of a tiny fledgling bird held in the hand a foot or so from the lens. Both problems require absolutely accurate focusing and steadiness. Yet, at the same time, the hunter must be able to carry his equipment on his back to the top of a mountain and transport it from place to place on an unstable, jogging horse without breakage or destruction of fine and delicate adjustments.

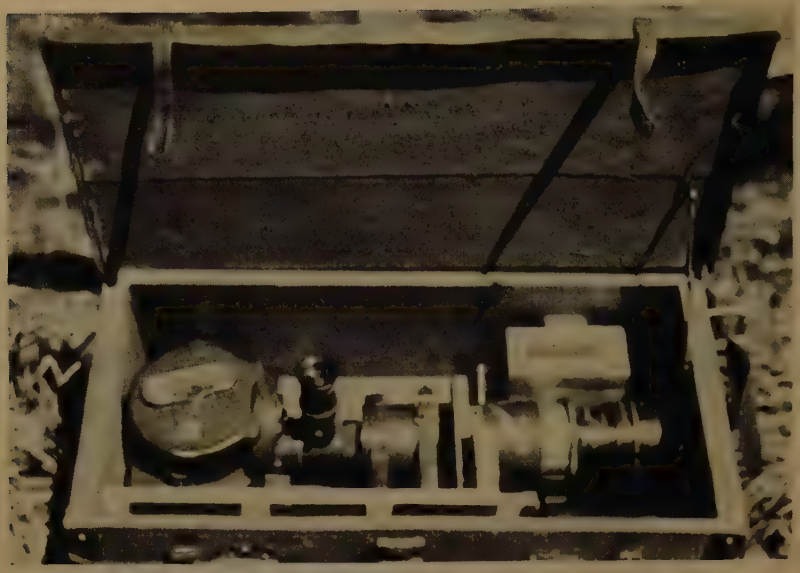
WITH TELEPHOTO LENS TRAINED
Caribou caught with a Rolleiflex camera against a noble background in the heights of Jasper

Suppose you round a bend in the trail and come face to face with a bear. How long will it take you to produce a camera and bring it into action? Too long—the bear goes over the mountain and you have nothing to show. Chance meetings seldom result in good pictures, but once in a while they do. For this work it is best to have the smallest sort of camera with 5-inch or 6-inch telephoto lens already attached to magnify the subject and make it appear nearer than it really is. Such, for example, is the little Leica, made in Germany. Around the neck of the camera hunter or tied to his saddlehorn, it takes up little or no room. You raise it and point and snap, and, if you had time to adjust the focus and did so properly, you have at least one little picture, which will enlarge. The Leica seems to stand a reasonable amount of shaking and abuse, incident to day in and day out carrying.

Most good wild animal pictures, however, are obtained from a "blind", or stationary hiding place. The photographer laboriously totes his equipment to a likely spot and then sits and waits while a guide or assistant may circle the game. In the meantime, he whiles away the hours by scribbling his notes or just hoping for that tremendous, glorious moment, that soul-satisfying, mighty thrill when the quarry approaches, nearer, nearer, sniffs the air and then again comes on. Ten seconds or ten minutes in a day of struggle and waiting, hands that tremble with overwhelming excitement, an instant of indecision as to whether to keep on shooting or flee, and then the game has gone! The picture —for better or for worse —is made, and homeward steps are light with the joy of the thing that is done.

WONDERING WHAT IT IS ALL ABOUT
The movie camera catches the dumb and always interesting expression on the face of the mountain goat

It is always best not to rely upon the results of a single camera during a long trip. There are so many accidents that may occur, so many possibilities of invisible damage to the interior works of even the simplest mechanism. Heat and cold, dampness and dryness, continuous joggling and shaking may take their toll and result in disappointment when the negatives are finally developed. Then, too, we should consider the question of the size of negative to use. A very small negative, if absolutely sharp, may enlarge satisfactorily to many times its original size, but the smaller the original negative, the narrower the limits of focus which must be observed to permit enlargement. In a camera blind the operator has to work fast and there



FOR SAFELY CARRYING THE EQUIPMENT

One of two boxes specially devised and built by Mr. Pack to insure safe travel on the pack horse

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A DEER POSES WITH APPARENT SHYNESS

Putting out salt will sometimes attract the does into camp but rarely a big buck like this one

is no time to rectify errors. A camera which takes an original negative of 4 x 5 inches, or postcard size, may take a little longer to bring into action than a very small camera, but the results may well justify its use. The chief trouble with most cameras is the focusing question. How accurately and how quickly can the distance be measured? Generally speaking, the larger the original negative size, the longer will be what is called the focal length of the lens—namely, the distance from the negative to the center of the lens; and the greater that distance is, the less latitude we are permitted for accurate focusing. Hence, the chances of sharp focus with big cameras, when used in a hurry, are fewer than with smaller cameras. The reflex cameras, such as the Graflex, which focus quickly on a ground glass viewed through a hood, are designed to overcome this difficulty and will do so. We took with us into the Canadian Rockies last season a new type of reflex camera called the Rolleiflex, which is exceptionally light and compact, although the largest model takes a roll film with a picture size of 2¼ x 2¼ inches only. This camera supplied a splendid practical compromise between the very small Leica type camera and the guess focus or heavy mechanism of the big cameras. It was the easiest camera to focus accurately that we have ever seen, and produced splendid results. For a hard trip we always use a roll film camera rather than one using plates and cut film or film pack. Plates are hard to carry and change; cut film is also awkward, and film packs so often get strained and result in light-struck pictures. With the new Verichrome and Plenachrome films, and with imported panchromatic film in rolls, the latitude of roll film cameras has been greatly increased. Roll films are available for some models of Graflex cameras.

A recent innovation in the still camera line bids fair to overcome many of the handicaps of equipment and to give to the photographer of wild life an exceptionally flexible outfit. This is the PAL-KO camera, which is a roll film camera taking postcard size pictures but with the advantage of accurate focusing on the ground glass.

GOING UP! AND UP!
This is the sudden meeting type of picture where the small, ready camera has its chance

With it one may make the very accurately focused close-ups necessary in some kinds of wild life photography, or beautifully composed views such as might be produced with a professional view camera. Although the camera uses 3¼ x 5½ film, it is not necessary to expose the whole film area at one time. The area may be cut down by the use of a screen, so that the finished picture is as small as 2 x 3, to conserve film. Furthermore, the length of the bellows and the ability to focus on a ground glass permit the use of a telephoto lens giving nearly double magnification. Therefore, we have an all-purpose camera which should be seriously considered by anyone equipping for a camera hunting trip. To be sure, the camera must be used on a tripod for the most effective ground glass focusing, and it is not capable of the very rapid operation possible with a very small camera or with a Graflex which will also accommodate a telephoto lens. However, its compactness and lightness would seem to more than offset the fact that its rapidity of operation is not quite so great as that of a reflex camera.

GANG'S ALL HERE
A group of mountain goats taken with a 17-inch telephoto lens

The hunter with still cameras only, however, is handicapped by his inability to record more than one or two single flashes of experiences and thrills which required days of travel, hours of back-breaking toil. He turns, naturally, to the movie camera, and, if he uses it properly, he soon becomes a movie-hunting enthusiast. Most beginners expect too

AN ECHO OF WORLD WAR CAMOUFLAGE DEVISED BY MR. PACK AS A BLIND

He is peering out directly beneath what looks to be a stove pipe but is really a telephoto lens. Mr. Pack used all the spare paint on the place to fix up this beach umbrella

much of a movie—they expect it to do unheard of things. Intrigued by magnificent scenery, they spray the camera up and down and around, so that the finished picture looks like a scene from an airplane out of control. Scenics in black and white are often disappointing, but carefully taken movies of wild animals are a most satisfactory form of outdoor pictures. For one thing, the movie naturally lends itself to use with a telephoto lens.

The moose that seems close at hand to the naked eye may appear infinitesimal in a picture made without this most useful appendage of big game camera hunting. The 16 mm. movie camera with ordinary one-inch focal length will readily take a small lens of, let us say, three-inch focal length that will magnify the image of our moose three times. A six-inch telephoto lens will magnify that image, of course, six times. Although each single picture of the moose is in itself very small, it is, on the other hand, tremendously enlarged in projection and apparently gives an effect that no still camera can equal.

An ideal small movie equipment for camera hunting is a good make of 16 mm. camera with a turret head permitting rapid exchange of lenses. One would need an ordinary one-inch lens, a wide-angle lens for scenics in the mountains, where great peaks could not be included otherwise, and a three-inch or four-inch telephoto lens. Then, because it is better not to rely entirely on a single camera, and even a guide can be taught quickly how to push the button of a second camera, a second, simpler movie camera could be taken without any turret head, but with means to attach either the ordinary lens or a six-inch telephoto. Advanced amateurs would, of course, use super-sensitive panchromatic film and have filters for all the lenses. Filters of deep orange or red variety are particularly useful in the mountains to penetrate haze and are just as valuable on a telephoto

THERE IS A LOT OF SCENERY AND CLIMBING IN THE PHOTOGRAPHER'S LIFE

Careful thought must be given to the most efficient way of toting about the most efficient equipment in places like this, otherwise some waste and back breaking result

lens as on any other. Mountain conditions are very variable.

A word should be said here about tripods. No one can take a steady motion picture with a telephoto lens by holding the camera in his hand, for the telephoto not only magnifies the image but also magnifies even the smallest jerk or tremble. There is nothing more disappointing than to see an otherwise splendid picture jerking all over the screen when projected. As a matter of fact, all pictures are improved and are apt to be clearer if the camera is on an absolutely steady foundation. Good, light, folding tripods with revolving and tilting heads are available in many makes, and one (or two, if there are two cameras) should go everywhere the cameras are taken. Sometimes when there positively isn't time for a tripod, steadiness can be approximated by propping the camera against a rock or tree. For climbing, one may use an alpine stock with a standard tripod screw in the handle. With this as a uni-pod and one's elbows to form the other two supports, fairly good results may be obtained in an emergency, but a real tripod is best, even if it does make one more thing to carry.

Mrs. Pack and I use standard 35 mm. equipment, which is almost the exact equivalent of the 16 mm. outfit mentioned above. We use the 35 mm. size film, in spite of the greater weight, bulk and expense, not only because the finished pictures frequently have to be shown in large auditoriums or theaters, but also because the resulting negatives are large enough for us to make still enlargements from selected frames. Again and again, when we have used a still camera and a movie camera side by side from the same blind or hiding place, the enlargements from the movie have proved better because we can select out of the hundreds of individual pictures which make up a single movie scene the one with the most nearly perfect pose. Then, too, we have learned that really good movies can be made only with an

absolutely firm camera on a tripod, while with the still camera held in the hand there is always the possibility of a picture blurred by trembling hands or limbs.

In order to obtain close-up pictures of some of the wilder animals, such as mountain sheep rams, caribou, or grizzly, one usually needs the highest degree of magnification. Just as the hunter with a gun needs a special high-powered rifle for long distance shooting, so the camera man needs its equivalent. To get 8½ times magnification with a standard movie camera I have a 17-inch lens which is itself so heavy that it would weigh down the front of the camera if it were not separately supported. Accordingly, I mounted both camera and lens on a light board and placed a tripod socket at the center of gravity of the whole outfit. This board fits against my back in a pack sack with shoulder straps for use when carrying the camera myself, particularly for mountain climbing; and the camera, with lens in place, is always ready to slip onto a tripod for use. I made little wooden guides to direct the tripod screw exactly into the right hole. Then camera and board fit snugly into a special homemade pack box with straps to fit over the pack saddle on the camera horse which we lead along on a halter for transportation from place to place in the mountains. Of course, there is a box of equal weight and size for the other side of the horse, and that carries my other movie camera, together with lenses, accessories and extra film.

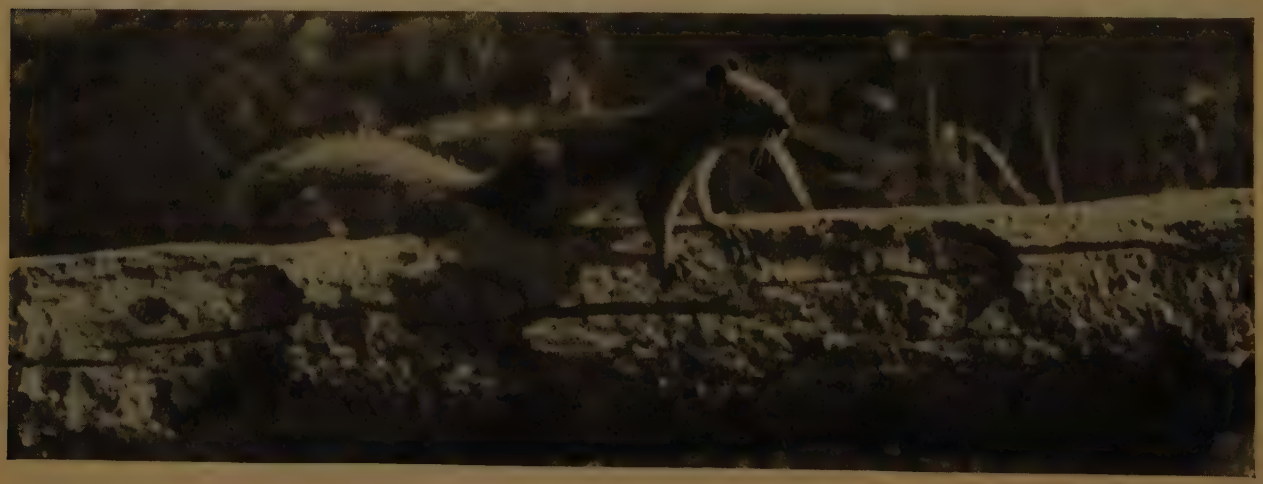
PTARMIGAN IN SUMMER FEATHERS

Below, one of the many interesting and agile folk one meets poses for a Graflex

The boxes are covered with canvas, so as to be waterproof, but both open quickly on the side to permit taking out the cameras without undoing any ropes or taking the boxes off the horse. Those boxes were the result of months of experience with various makeshifts, and represented the labor of many spare evenings and holidays during the winter.

Another useful bit of equipment for camera hunting is a portable blind which serves to hide the photographer from the wild animals. My best blind is a beach parasol of the folding variety, which I bought cheap at a sale. In my garage I spread the umbrella, got out all the odds and ends of green, brown, and yellow paint about the place, and with these laid on a camouflage such as was used during the war to conceal artillery, motor trucks, and battleships. No original experiment ever worked so well as that did on our next camera hunting expedition. In the bare upper mountain barrens I would raise that umbrella and crouch behind it, while the camouflage pattern melted into the landscape and even my own guide looked in vain to spot me. The umbrella blind, with the tripods, travels on top of the camera boxes on the led horse, the long cases firmly but quickly fastened down to the box tops with short leather straps.

Camera cases and camera carrying devices are clearly among the things which should be carefully planned in advance for either hiking or horseback travel. For climbing, one needs both hands (Continued on page 299)



WEST VIRGINIA

Tufted Titmouse is State Bird of West Virginia. On crisp frosty mornings after a storm has left the ground white and sparkling with snow, the clear, oft-repeated, whistling call of the tufted titmouse announces the fact that he is hard at work hunting out insect eggs and such small creatures as may spend the winter months hidden away in crevices. This activity is a year-round job with his tribe so that the good he and his cousins, the chickadees, do, is hard to estimate. Though they are tiny they are numerous, often there will be two broods of five to eight in a season and the whole family travels together throughout the winter. As a nest for the creamy, evenly marked eggs they line a deserted woodpecker hole or the hollow of an old stump with bark strips, leaves, moss and feathers. Tufted titmouse is a permanent resident in most of his breeding range which extends over the southern half of the United States east of the Rocky Mountains. During the winter months he is a cheery visitor to food shelves or other devices which offer a plentiful supply of sunflower seeds. He also takes some suet and rolled oats.

TUFTED TITMOUSE—*Baeolophus bicolor*

EASTERN BLUEBIRD—*Sialia sialis sialis*

MISSOURI AND NEW YORK

Eastern Bluebird is State Bird of Missouri and New York. Everyone loves the bluebird, harbinger of spring to those of the north and friend of those who live within its winter range. Bird boxes and hollow trees in orchard, grove or garden near human neighbors will be used year after year. There can never be too many homes provided and kept free from English sparrows, because we need the cheerful song and helpful ways of this beautiful bird. The nesting place is lined with weed stalks and fine grasses. There are four to six pale bluish-white eggs. Both birds share in feeding the young and the male cares for the first brood while the female is busy with the second set of eggs. In feeding, it is the habit of the bluebird to fly from a perch to the ground and return with grasshopper, beetle or cutworm to eat at leisure. It is not surprising, therefore, that he turns fly-catcher on occasion and adds winged insects to his bill-of-fare. Bluebird families usually remain together until the following spring and in the milder parts of their range, numbers of them will occupy a single bird house during the night.

SUGGESTED FOR IOWA

The Sparrow Hawk is found all over temperate North America, varying slightly according to different climatic conditions. It is the smallest and one of the most beneficial of our hawks, feeding largely on grasshoppers and other insects. It selects a high perch in the open from which to launch out over its prey, sometimes remaining poised with rapidly beating wings, before dropping lightly on its victim. This it carries back to the perch to eat at leisure. The male and female differ somewhat in color markings, but they are seldom far apart and the cry of "Killy, killy, killy," will identify either of them. This hawk chooses some natural cavity in tree or rock, or sometimes a nest box, in which to raise its young. The three to seven eggs are creamy white thickly marked with brown. Both birds share in the care and feeding of the young. The family remains together during the season, ranging over the fields and meadows in its chosen habitat. They take mice and other small mammals as well as insects, and should be protected. They winter in southern Ontario, Iowa, Kansas, Mexico and Costa Rica.

SPARROW HAWK—*Falco sparverius*

BOB-WHITE—*Colinus virginianus*

OKLAHOMA AND RHODE ISLAND

Bob-white is State Bird of Oklahoma and Rhode Island. Perhaps no bird's call has been more widely used as a signal than that of our American quail, the bob-white. Its clear, sharp, musical note has a carrying quality possessed by few. This is the only quail in eastern United States, and is a much loved bird wherever known. In the north it is called quail; in the south, partridge, but he calls himself Bob-white, and so he is known by bird people all over the country. He remains the year round in his chosen home, a useful friend to the farmer, because he eats harmful insects and weed seeds. The male usually incubates the first ten to eighteen pure white eggs and has been known to bring off a brood successfully, unaided. When undisturbed, the flock hunts together, picking up titbits as they walk sedately along or run short distances to capture a particularly luscious bug or beetle. If alarmed they scatter and "freeze" until called together by the plaintive "quick" call of the leaders. At night they sleep in a group, tails in, giving each an even chance to make an unimpeded, explosive exit.

CALIFORNIA

Valley Quail is State Bird of California. It has been abundant throughout its range in valleys and foothills of the Pacific Coast from Oregon to Lower California and has been successfully introduced into other states with suitable habitats. Usefulness is added to beauty and attractiveness by the fact that its food is weed seeds and insects which are injurious to agriculture. The dozen to sixteen irregularly spotted, buffy white eggs are placed in a grass-lined hollow beside a fallen log, brush heap, or sheltering rock. The young are dainty, fluffy mites, quite able to care for themselves soon after hatching. It is a delight to accept their invitation to "stay right here, sit right down," when one enters a semi-shaded patch with moss-covered logs for seats. If you do stop you may see the covey come sedately along with nodding plumes. One may see them feeding among the alfilaria in an orchard which borders the uncut edges of a river bank. They will pay little attention to you if you make no sudden movement, but wander about, talking softly to one another, while you admire their beauty and dainty ways.

CALIFORNIA QUAIL—*Lophortyx californica*

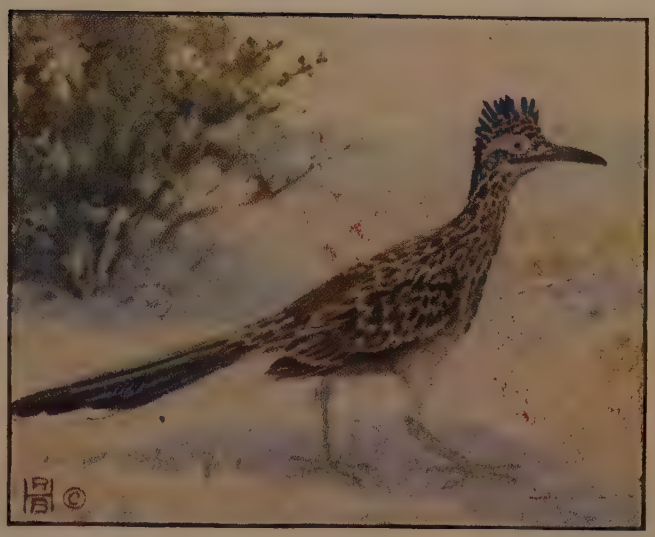
RUFFED GROUSE—*Bonasa umbellus*

PENNSYLVANIA

Ruffed Grouse is State Bird of Pennsylvania. This hardy dweller of northern woodlands is growing rarer as its native haunts are being cleared of their protective cover to make way for farms or to serve as lumber, and since the hunters have so increased. The bird is non-migratory, hence does not re-establish itself in localities where it has been extirpated. The habit of the male of perching upon a log or rock and making a rolling, drum-like sound with its wings is one never to be forgotten when once observed. Its nest is placed in a depression near a rock or fallen tree. There are eight to fourteen pinkish, buffy eggs marked with brown. The young are characteristic fluffy infants, quite able to leave the nest as soon as the first downy coat is dry. It is nearly impossible to see them when quiet, they are so much like their surroundings. Their food consists of insects, seeds, nuts, leaves, buds and berries. They live in the forests of Canada, in our northeastern states, west to the Plains, in Rocky Mountains south to Utah, and in Washington and Oregon. They have been raised in captivity.

NEW MEXICO

Road-runner is State Bird of New Mexico. An unusually thrilling moment is that which marks the first sight of a road-runner in full action. His swiftness of foot is well known in the cactus-covered desert, and the chaparral of the foothill country, which he prefers to the higher altitudes sometimes visited during the summer. A casual glance at his track is misleading for he has two large strong toes turning backward and two forward. This character and some of his calls show his relationship to the cuckoos. He is an unsocial creature and will not admit another of his kind to his chosen feeding range, yet at times he will visit the farmyard and feed with the chickens. His appetite is voracious; lizards, large beetles, centipedes, grasshoppers, mice and snakes are a few of the items of his diet. He, or she, builds a compact nest in cactus, low thorny tree or bush, using sticks with a variety of materials for lining—inner bark, grass, mesquite pods, roots and feathers. There are four to six yellowish eggs. Unfortunately this curious bird is becoming scarce due to the extension of farming into his desert habitat.



ROAD-RUNNER—*Geococcyx californianus*

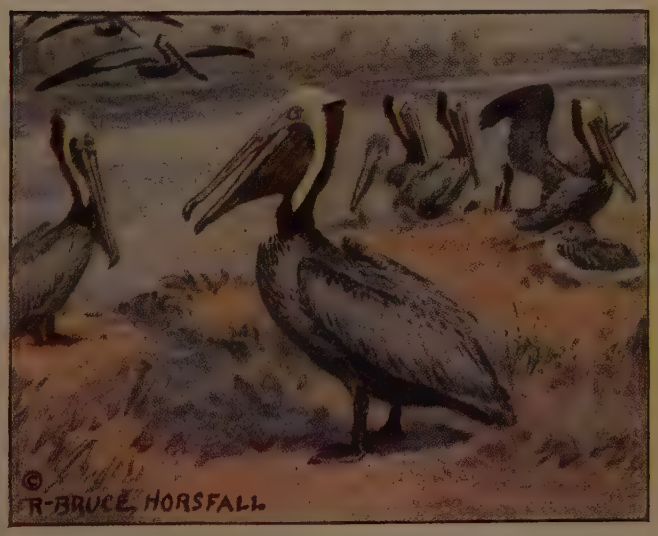
CALIFORNIA GULL—*Larus californicus*

UTAH

The Gull has been State Bird of Utah since the crops of early settlers were saved from destruction by the timely arrival of immense flocks of California gulls which devoured a pest of black crickets. These birds are common in winter on the California coast but breed on the interior lakes from Saskatchewan to Great Salt Lake where a large colony occupies an island at the southern end. One brood is usual, both birds sharing in incubation and care of young which hatch from two to four brown-blotched eggs. The plumage of the young is dark and mottled. It is not until their third year that they acquire the white plumage, gray back, black-tipped wing, yellow and orange color of bill and feet common to both sexes of adult birds. These graceful masters of flight hunt in flocks over newly-plowed fields for crickets worms, mice and the cutworms the plowmen unearth. Later they scour the country for grasshoppers and other insects. They are peaceful birds, not predatory, nor do they destroy the young of their kind as do the herring gulls. They fully merit the honor which the State of Utah has bestowed upon them.

LOUISIANA

Brown Pelican is the State Bird of Louisiana. They are colonial birds of the gulf and southeastern coasts of United States and south to Brazil. Locally migratory, they return to their nesting sites on islands, shores and sandbars, for the three or four months necessary to raise the young. Pelicans in Louisiana lay the two or three dull white eggs on the open shore or in nests built of straw and reeds, but, where mangroves grow nests of weed stalks and sticks are placed in their branches, thus averting destruction by tidal storms which overtake many shore nests. Both birds share in care of eggs and young. A curious interchange of bowing takes place as the male relieves the female at the nest. Their food is fish, largely species not used as food by man. For these they fly long distances and capture them by diving with semi-folded wings. They sometimes hunt in groups, encircling a school of fish to drive them into shallow water for the catch. With full pouches they return in a long straight line near the water, soaring or flapping wings in unison. The adults are silent birds but the youngsters are noisy creatures.



BROWN PELICAN—*Pelecanus occidentalis occidentalis*

BALTIMORE ORIOLE—*Icterus galbula*

MARYLAND

Baltimore Oriole is State Bird of Maryland. On the outermost end of a high elm branch, swaying gently in the breeze, one of the most marvelous of bird structures challenges any enemy to do its inmates harm. Eight inches long and gourd-shaped, it is woven of plant fibers, strips of bark and other similar materials upon a suspended warp. The durability of its structure is noteworthy; six nests have been seen on one tree representing as many seasons. The female does the weaving while her gay, handsome mate sings to her. She is a modern person who uses twine to strengthen her building. She lays four to six brown-penciled white eggs. It is said that her children are great cry-babies, but it cannot be for lack of a comfortable cradle. The Baltimore oriole is one of our birds that eat the cotton boll weevil, as well as the larvae of the click beetle, plant and wood lice, spiders, wasps and grasshoppers. Hairy caterpillars found on his hunting ground are quickly reduced to mere shells. It nests in eastern North America and spends the winter in Mexico, Central America and northern South America.

SUGGESTED FOR NEW JERSEY

Poised over the spring meadow, Bobolink pours forth his rollicking notes. Hidden somewhere in the field below is the grass-lined nest containing four to seven pale gray eggs which are blotched with purple-brown. This home is presided over by his demure mate who takes entire charge of the eggs. When these are hatched the male shares the care of the young for the short time necessary to prepare them to do their own hunting for insects and seeds of weeds and grasses. One not wise to the ways of bobolink would never suspect the family relationship; but after they are all grown and have paid their rent by destroying many pests, the male changes his gay coat for one which matches that of the rest of the family and joins the flocks in the marshlands of our south, where they are known as rice birds and become so plump and fat that they are called butter birds in Jamaica on their way to South America. During the winter the song is mute but in April flocks of males reach Florida on their way north. They have again donned their gold and black frocks and are filling the air with their joyous songs.

BOBOLINK—*Dolichonyx oryzivorus*

MOCKINGBIRD—*Mimus polyglottos*

ARKANSAS, FLORIDA, MISSISSIPPI, TEXAS

Mockingbird is State Bird of Arkansas, Florida, Mississippi and Texas. Western mockingbirds inhabit the southwestern part of the United States, their range meeting that of the mockers of the east and south somewhere west of the Mississippi. Throughout the year they sing as they eat the rice weevil, chinch bug, cottonworm and wild fruits. One has been induced to stay in an unaccustomed locality in northern California by keeping grapes on a drying table all winter. The male polices his territory, sounds alarm to all birds in the neighborhood, and is unfearing in defense of his nest, which is built of twigs, weed stalks and grasses, lined with moss and fine rootlets. There are four to six greenish-blue eggs with freckles at the larger end. Both birds share in caring for the family. However, there is no diminution in the song of the male, for not only during the days but during the nights, especially moonlight ones, his wonderful melody pours forth. During the winter time mockers will visit food trays regularly, especially if small raisins, cranberries, suet and rolled oats are always ready for them.

BIRDS OF THE STATES

FIVE STATES HAVE YET TO CHOOSE OFFICIAL AVIAN EMBLEMS

BY RICHARD W. WESTWOOD

IN THE article about the State Birds published in the October issue of Nature Magazine only four States were listed as being missing from the list of those that had chosen an official avian emblem. The States mentioned were Connecticut, New Jersey, Indiana and Iowa. This quartet, to be sure, still have the words "none selected" in the official listing, but there is one more—Tennessee. There was no intention to slight this native commonwealth of so many birds and bird lovers. It was just oversight.

In the booklet, "Birds of the States," the main article suggests as a possible choice for Tennessee, the painted bunting. The suggestion was made merely to stimulate interest and with the thought that this bird might be appropriate since no other State had chosen it. In any event, we are glad we failed to mention Tennessee in October because it has brought to light not only the evidence of activity there, but some interesting comments on the painted bunting. These comments come from Robert Sparks Walker—poet, writer, naturalist, and lecturer—of Chattanooga.

As to the qualifications of the painted bunting, Mr. Walker writes that "I would object to the choice of this bird for the simple reason that we might as well adopt a mythological bird, because the painted bunting is practically unknown to our people. I am a native of Tennessee and have been studying birds for more than forty years, and I have yet to meet the first bird of this species in our State. I have travelled throughout Tennessee and have passed hundreds of Boy Scouts and Girl Scouts for merit badges in bird study, but I do not recall that one has ever mentioned this bird in qualifying."

Mr. Walker's comment is interesting and well-grounded. However, Nature Magazine holds no brief for its suggestion. It was merely supposed to be provocative, and we are glad to know that it proved to be so. Mr. Walker also reports progress in Tennessee and it would appear that the number of States without official birds is soon to be reduced to four.

"The bird that should be selected by any State, as well as Tennessee," Mr. Walker writes, "should be a bird that is a resident for twelve months in the year and one that everybody knows. This, of course, would prevent the adoption of any one of the migratory birds. For this reason, when I was asked last year by the Federation of Garden Clubs to suggest a fitting bird for Tennessee's adoption, I at once named the mockingbird first and the bobwhite second. Of course Tennessee has the usual number of other common birds, but inasmuch as it seems we shall have to select one that has already been chosen by some other State, it seems to me that our best bird for this honor is the mockingbird. All the year he remains with us, doing his useful work, displaying his beauty and spreading his good cheer. Indeed, while other songsters are wintering in warmer climes, he stands by and delivers their messages in songs to us."

This brief in behalf of the mockingbird is a strong one. The only possible question that might be raised is that this bird has also been selected by Florida, Mississippi and Texas. This, however, is of no special importance, and it did not bother the Federation of Garden Clubs members at their recent convention when they went on record in favor of the mockingbird. Bobwhite was second choice. This action marks the start of the mockingbird's campaign. It is to be hoped that some method will be provided for obtaining an expression of popular sentiment about the Tennessee State Bird. Through this means attention is focused upon the economic value of our songbirds and more and more interest is stimulated in their protection and care.

No reports have been received from the other four States missing from the active column, except that in Indiana there is a strong support for the cardinal and in Iowa a battle between the goldfinch and the dickcissel, with the former having the lead. Connecticut and New Jersey are still in the column of "doubtful States," so doubtful, in fact, that no movement of any sort has been reported looking to the selection of a State Bird.

We cannot overemphasize the value to us of our birds, both as our allies in the continual battle against insect pests and as friends of beauty and song. It is to be hoped that the rising generation may be given a chance to express its views in the choice to birds in the five remaining states.

With this issue, Nature Magazine completes the publication of the colored pictures of the official State Birds. The entire collection of thirty colored pictures of the birds, together with the story of their selection, a listing of the birds by States, the manner of their selection and the action taken to recognize them, has been collected into a sixteen-page booklet under the title "Birds of the States." This booklet also includes a lovely panel of the cardinal and a full-page picture of our National Bird, the American Eagle. This booklet is available separately at fifty cents a copy for single copies, or at twenty-five cents a copy when ten or more copies are sent to one address. Further details may be found on the inside back cover of this issue of Nature Magazine.

THE VICTIM OF PERFIDY

The prisoner bee is unable to meet the ants' attack. At the right is a pair of pollen balls showing the button-like knob to which they are attached

THE "JUDAS" FLOWER OF THE MILKWEED

IT SOMETIMES TRAPS ITS MOST FAITHFUL FRIEND

BY J. L. COLLINS

THE MILKWEED is among the most perfidious of all plants, for it frequently causes the death of the very creatures on which its continued existence depends. This common wayside plant, *Asclepias speciosa,* is absolutely dependent upon the visits of insects for the pollination of its flowers. Yet sometimes it traps the honey bee that comes to bring the life-giving pollen and holds the poor creature prisoner until it dies of exhaustion or becomes the easy prey of swarms of ants.

The flowers secrete a nectar which is eagerly sought out by the foraging honey bee but which often costs a tremendous price. When the bee visits a bloom, she first lights on the smooth, glassy surface of the flower center; but this is too slippery to stand on, and her feet promptly slide over the side. As she frantically clutches the side of the blossom to regain her balance, a foot often slips into the lower and wider part of one of the crevices, alongside of which are the pear-shaped pockets containing the pollen. As she draws her foot upward, the cord connecting the two pollen balls catches on it, and the pollen masses are drawn out and dangle from her claws. And when she visits another flower, the sticky pollen is brushed upon the stigma, thus fertilizing it. The great numbers of pods that one sees on the milkweed in the fall are evidences of the efficacy of the bees in performing this office for the plant.

FLOWERING BRANCH OF MILKWEED

This prolific wayside plant is dependent on the bee for its perpetuation

It would appear to the average human that the milkweed should be most grateful to the bee for her kindness, and treat her always with consideration. Such, however, is far from the case.

Not only bees, but flies, ants, and beetles meet death in her garden. In the process of this unwitting gathering of the precious pollen, the foot of the busy insect may become hopelessly entangled in the crevices of the fragrant blossoms. To the bee-keeper, indeed, these milkweed traps may be serious enough. In a number of cases a suffering apiarist has been forced to do away with a neighboring field of these showy plants in order to save his colony from serious losses.

GROW HOLLY

BY MARY LOUISA HELLINGS

A WELL-ROOTED, YEAR-OLD CUTTING OF HOLLY THAT IS READY TO BE TRANSPLANTED INTO THE GROUND OUTDOORS, THERE TO FLOURISH INTO A TREE OF REAL BEAUTY AND VALUE

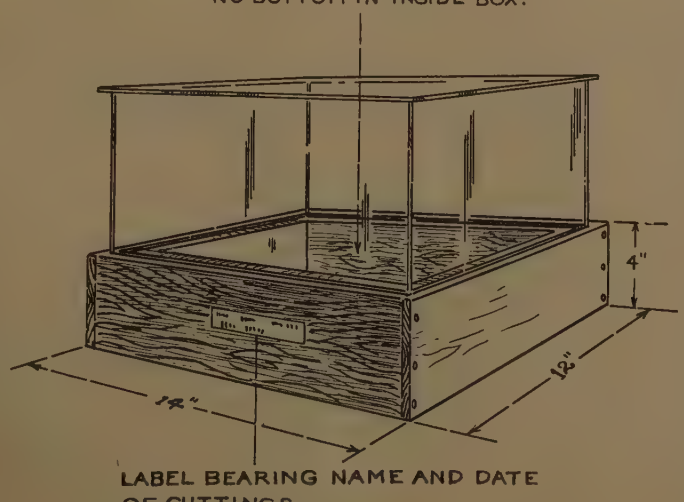
BECAUSE their branches have long been a colorful part of Christmas, expressing gladness and good cheer, the great demand for our American holly has become more than Nature can supply. It is, therefore, our opportunity and duty to lend her a helpful hand and grow holly for posterity. To have the desire to help replenish the land with trees that have been taken away is a gracious gift in keeping with the spirit of Christmas.

Think of all the people of the cities, children especially, who cannot have the trees and flowers of the country to fill their hearts with that growing spirit of life! It does not seem right that they should also be deprived of evergreen plants that carry the message, "Merry Christmas," to them. Since they cannot directly help in the growing of what they enjoy, the problem and privilege rests with those who can.

So I have experimented with the propagating of holly, and have found a simple and quick method of rooting cuttings that anyone should find it a simple task to grow holly. The grower is soon more than repaid for developing cuttings since by careful clipping of well grown stock each year, one can sell them for wreath purposes and still have a splendid hedge or a small tree as an ornament. For the practical individual there is a good commercial trade in growing holly to sell. Its excellent lasting qualities are greatly in the grower's favor, as there is not the danger of loss in sales as with cut flowers. Small grown plants may be sold for potted decorations, or to anyone wishing to make ornamental plantings outdoors. Four-year-old stock from cuttings are Nature's own Christmas trees adorned with luxuriant green leaves and bright red berries. And there is no chance of holly becoming too plentiful because the demand is far too great for the supply that is diminishing today.

Nature's method of reproduction of holly by seeds is slow, and the percentage of success is so low that, even though one had the patience to undertake it, growing holly from seeds would not be practical because many of the seedlings would not turn out to be of the berried type. Holly, you see, is dioecious—the flowers having stamens and those having pistils not being borne on the same tree. But cuttings from trees that are prolific bearers of the red berries do away with those years of delay, and you know what you are growing from the start.

The old way of taking cuttings did not prove at all successful, and I decided to experiment at different times during the year. I was surprised to learn what difference the time of the season of the experiments made in rooting holly. The one which proved most successful averaged about seventy per cent. The cuttings were taken in the latter part of August, using such of the current year's growth as was well foliaged. Clean cuttings were made on a slant through a leaf bud on the twig. A better percentage rooted from this form of cutting than those made on twigs between the leaf buds. These were placed in glass-covered propagating boxes in which six inches of equal parts coarse sand and leaf mold were mixed and kept moderately wet. If one has peat moss instead of leaf mold it will give as good if not better results.



HAND PROPAGATING BOX WITH GLASS SIDES AND TOP. A BOX IS FIRST MADE WITH SIDES AND BOTTOM, WITHIN WHICH ARE PLACED THE SIDES OF ANOTHER BOX WITHOUT BOTTOM. THE GLASS FITS BETWEEN THE TWO BOXES WITH A LARGE SHEET OF GLASS ON TOP. WITH THIS ARRANGEMENT THE BOX CAN BE USED INDOORS OR OUT AND WILL HOLD ABOUT ONE HUNDRED CUTTINGS

The planted cuttings are kept from the sun and at a warm temperature averaging seventy degrees. Some of the cuttings will naturally be better than others, and these will root by the latter part of September. But most of them will not root until the end of the year which is remarkable considering the other experiments which took twice as long, if not

longer, and only a fair percentage at that.

The most difficult part, I found, was in handling the rooted cuttings. It seems necessary for each cutting to have a good root growth established before being potted, and then it should not be put in soil that had been enriched with plant food. The use of three-fourths wood soil and one-fourth coarse sand seemed a moderate change from the soil in the propagating box. The potted plants should not be put into the sunlight for at least two weeks after potting, and care must be taken that the soil is kept just wet enough. Also do not allow the temperature to vary much from seventy-five degrees. After two weeks the care may be like that for other potted plants.

THE BEST RESULTS COME WITH TWIGS CUT ON A SLANT THROUGH THE LEAF BUD AS SHOWN BY THE DOTTED LINE

These young cuttings will not winter well outdoors the first season in the northern sections. They are best left in pots the first year, setting out in the ground about the last of May of the year following. They will then be well-rooted plants able to live through the winter. By placing the potted plants in an ash bottom cold frame during the summer, they are easily taken care of and protected during the first winter.

Aside from all the beauty it creates, the commercial importance of growing holly from cuttings is increasing. To each practical individual or nurseryman it will mean much in dollars and cents to be able to root cuttings in a short space of time with a good percentage of success. A satisfaction to both the tree lover and commercial grower even though their ideas are nothing alike. It is a case where a tree that grows for you is a tree that grows for everyone, fanciful or real.

Just as every tree has its beautiful season, so has the holly. Colorfully decorated by Nature with glossy green leaves and bright red berries, it is one of the most cheerful tree friends one can have as a companion in the winter. In the quiet, cold stillness of early morning, when each snow-gemmed twig is like a jeweled gift, the holly is truly one of earth's treasures. A delicate consonance of beauty centers about this particular evergreen when the somnolent peace of winter comes to the trees. Sleeping, as it were, during these argent nights of snowfall and frost, the holly holds its glossy leaves in a graceful poise of relaxation while awaiting the mystic call of springtime to awaken it. Just so there is a beautiful manifestation of life revealed to anyone who places a cutting in the sand to root. To help it in its sleep to gather strength to grow—what greater mystery than the mystery of creative life! The strange absorbing vigor in it joining forces with your care which animates it is worthy of all the time you give.

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BURS OF COMMON PLANTS

NO. 9—THE GROUND BURNUT

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BY SALOME COMSTOCK-MILLER

GROUND burnut is perhaps not a true bur, nevertheless it is distributed by passing objects. It is regarded in some places as a coming nuisance on account of its tendency to puncture tires and its possibilities of rapid spreading. It grows flat on the ground, sometimes forming a mat six feet in diameter.

In the axil of almost every leaf is a blossom which produces a bur of four or five sections, each about five-sixteenths of an inch long, and each containing three seeds. At maturity the burs fall off and usually separate into their parts, each of which is three-sided and has two stout sharp spines.

When the bur falls and is blown about, one of these spines is usually found projecting upward in the position of a tack placed head downward on the floor. These spines are probably not as strong as tacks of the same size; but they easily penetrate the soles of tennis shoes and also puncture worn bicycle tires.

Animals especially suffer from them. The distribution of this plant is mainly in the Southwest. It is often referred to as Texas bur, or California puncture vine.

CHARLES KELSEY, BANKER AND BIRD LOVER
The photographer snapped this when Mr. Kelsey was intently watching a bird and did not know that his picture was being taken

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A BANKER TAKES TIME OUT

Another article in the group devoted to the Nature hobbies of men and women whose daily work leads them along paths different from that of the naturalist.

BY JACK VAN COEVERING

"I SAW a partridge in my yard this morning. Would you care to drive over at noon, and see if you can get a photograph of him?"

It was Charles B. Kelsey who telephoned me. His home is right in the center of Grand Rapids, Michigan, several miles from the city limits, whichever way you go. Certainly, to find a partridge there, would be unusual. But not so unusual, if you know "Charlie" Kelsey. When an investment banker takes time out in the middle of the day to show a newspaper man an unusual bird in an unusual place, you may mark him as a lover of Nature and a keen observer of Nature's ways, and no mistake.

It so happened that our quest for the partridge was not rewarded, but my visit was very much worth while, just the same, for here, in the center of the city, Kelsey had created a little bird paradise unsurpassed. Ever since his boyhood, when he saw the passenger pigeon darken the sky with its millions, and then saw it fade away under the destructive killing of man, birds have had a fascination for him. To this day nothing has a stronger lure for him than a few musical notes live-wrapped in a bunch of gay feathers.

A FRIEND OF MR. KELSEY
One of the many youngsters hatched in his trees, at the end of its first flight

The grounds surrounding the Kelsey home are well shaded with elms, a few pines, oaks, and maples. Bordering the perfect lawns are tall shrubs and bushes, which really do not look any different from those on other well-kept grounds. Yet in those shrubs and trees, Kelsey has observed nearly every Michigan bird, and not a few have nested therein. On the east wing of his home is a screened porch, overlooking a semi-hidden pool and fountain.

"That is my bird-observatory," he explained. "All summer I have eaten my breakfast there, to the music of the warblers, the thrushes and the bluebirds. This summer I have had a wood thrush nesting right in that tree for the first time, and if there is heavenly music, it is that of the wood thrush."

Kelsey has a simple explanation for attracting such a large variety of birds to his city home. While the lawns are perfectly rolled and mowed, this "civilization" stops with the border-line of flowers, and where the shrubs begin. Beyond the shrubs is bird paradise. For a width of from ten to twenty-five feet, everything is permitted to grow in a wild tangle. There is deep shade and plenty of cover. Branches are thrown in to add to the wild appearance. Leaves are never raked away.

"Don't make your yard too civilized," says Kelsey, "and the birds will come to you." The pool, visible from the screened porch, is the natural watering place for the birds, and it provides varied entertainment for hours at a time for anyone who loves to observe the birds.

Among the birds Kelsey has observed nesting near his home during last summer are the robin, brown thrasher, oven bird, wood thrush, catbird, cardinal, mourning dove, rose-breasted grosbeak, chewink, red-headed woodpecker, flicker, grackle, jay and bluebird. In the winter he feeds them, and it is surprising how many feathered folk come to his open air cafeteria.

Kelsey's love for the birds is but one side of his enjoyment of the out-of-doors. None whips a fly more deftly than this Grand Rapids sportsman. No better companion on the stream than he, to whom a flitting butterfly which reflects the myriad colors of sunlight is as absorbing as

the strike of a mighty fish. Kelsey mingles gladly with the organized conservation groups of his city, and takes part in their activities. His office is always open for a chat on the outdoors. He will forget business for hours at a time to tell of the passenger pigeon and its sad disappearance. But most of all, he delights, when eating his breakfast on the screened porch, to hear the birds singing, early in the morning. And he feels this is the way to start a day.

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SAHUARO, PALO VERDE AND THE HORNED TOADS

At the left the cactus and the tree that mothers it. At the right the older toad and the offspring of others. Below the sahuaro that is foster mother to birds nesting in it as the nest holes show

SPINY FOSTER MOTHERS

BY INDIAN MILLER

SPINY exteriors strike the keynote of the plant and animal life of the Southwest, but to one who knows this life, it seems there must be something of sweetness and light beneath the knobs and the needles, something which in humans would be called kindness. Perhaps it is unconscious—*quien sabe?*—but yet it is there.

Towering above his neighbors stands the giant cactus, the sahuaro, greatest of all desert creatures, chief of the cactus family. Little, really, is known of the history of this grotesque, spare plant. We know that they live many years, perhaps several hundred, and that they grow slowly. We know that they have long been of great utility to the red man, providing him with fruit, with shafts for his arrows, fuel for his fires, shade for his comfort, landmarks for his guidance and grandeur for his admiration. We know little about its youth—except one thing; it sometimes has a foster mother.

Perhaps you have noticed, among the neighbors of the sahuaro, a plant that stands out like a black sheep in a herd of white ones, a plant that is green though it has no leaves and is covered with thorns. It is the palo verde, which is almost as remarkable among trees as the sahuaro is among cactuses, though it grows to be only about one third as tall as its companion. Under this tree, it seems, the young sahuaros come for shelter, growing under its protection a dozen at a time. Often it seems that the palo verde has no other purpose in life than to nurture these youngsters. Nor are they ungrateful, for they bear their foster-mother upright in her old age.

While the sahuaro leaves its own children to another to rear, it is not unmindful of the children of birds which live in the cliff-dwellings made by the wood-peckers in its trunk. Food and shelter it supplies them directly from the flesh and blood of its life.

The third of the spiny foster-mothers that dwell on the desert is a tiny creature, comparatively. It is the horned toad. Like the sahuaro and the palo verde, it lets its little ones wander at birth, but is the friend of all baby horned toads wherever it finds them. One grown female Texas horned toad was observed to remain motionless for a long time, evidently because an infant had climbed on its head, and it did not wish to disturb it.

Adult toads placed among children of the same species in captivity will never injure the little ones, and show great patience, if not pleasure, in having them on their backs. They will never fling them off. Who can say the sahuaro has no heart? Or that the palo verde does not feel for the young plants it nurtures? And what about the blessed little horned toads? Nature moves in many fascinating and mysterious ways, of which these are but three.

BLUE ARE THE GEMS OF DECEMBER

BY AUGUST POHNDORF, JR.

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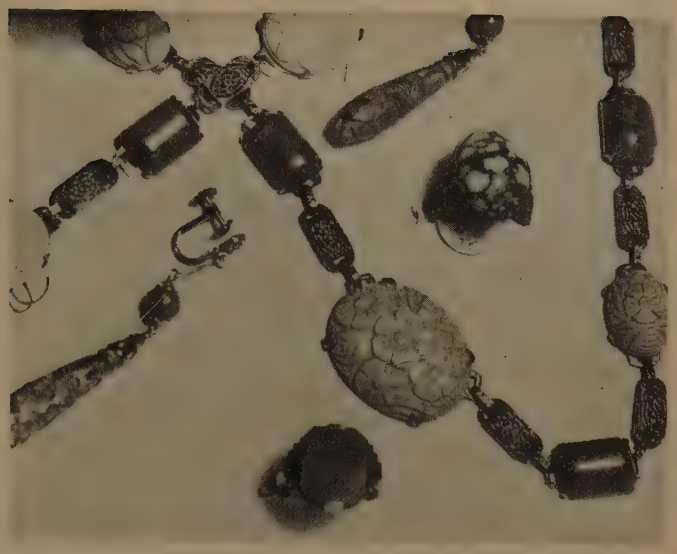
This is the last of a series of twelve articles on the precious stones that mark each of the months, written for Nature Magazine by Mr. Pohndorf, Colorado gem expert. We trust that our readers have found these articles of present and permanent value and interest.



JEWELRY FROM DECEMBER'S BIRTHSTONES

Both turquoise and lapis-lazuli lend themselves to fashioning into a variety of ornaments

THE BLUE of the turquoise, most precious of all opaque stones, and the blue of the famous lapis-lazuli are the gem-colors for the last month of the year. And no other stones could so well represent the winter skies and the pellucid blueness of frozen rivers and lakes.

China, seat of most of the ancient culture, was first to extol the virtues of the turquoise; the Orient concurred, and retailed its knowledge in the highways of its commerce. Greece and Rome fell heir to it and bequeathed it to Europe, which multiplied and compounded its virtues. In the Sixteenth Century a gentleman would have as readily consented to appear without his ruff as without a turquoise ring.

It was not only the beauty of the stone, however, that gave it such popularity. Did it not cure all diseases of the head and heart, and was it not, as the books said, "a sovereign remedy for hernia, swellings, flatulence, dyspepsia, insanity and cancerous sores"? Had not so venerable a sage as Aristotle recommended its use in wine to counteract snakebite and poison? So the gentlemen of Queen Bess' Court were not so unwise in their choice of a stone to wear.

When the chemists analyzed the turquoise, however, they could find none of these magical properties—but then, perhaps their tests were too coarse to capture such subtle "Virtues". They found that its color was due to copper, that it was a hydrous phosphate of aluminium and copper, and that an excess of iron as an impurity would change the stone to green. They also determined that the water content in the gem was most important to its luster, for when this was driven off by heat, the jewel became a lusterless, dirty green.

Although the seams and small pockets in the alkalinic feldspar rocks in which turquoise is found yield stones varying in color from a beautiful sky-blue to green, the "robin's-egg-blue" is the finest and most desirable gem. The luster of all turquoises varies from a glassiness to a waxy tone. The more popular varieties have a hardness of about 6, and weigh about three times as much as water.

There is a pseudo-turquoise, called Occidental Turquoise or Odantatile, which consists of the bony remains of prehistoric animals colored by iron phosphate. This imposter has a grained, ivory appearance, differing from the dense, uniform appearance of the true stone, and blackens and gives off an acrid animal odor when burned, while real turquoise does not burn or melt, but turns brown. An expert can separate the two in an instant.

The best stones come from Persia, although good quality gems are derived from China, Siberia, Arizona, California, Colorado, Nevada, and New Mexico. The American Museum of Natural History has recently added to the Morgan collection of gems a beautiful Chinese

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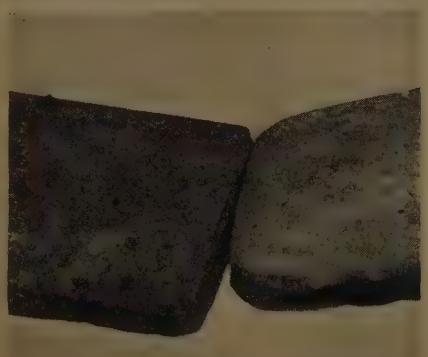

TWO VARIETIES OF LAPIS-LAZULI IN STONE FORM

At the left is that found in Russia and at the right the lighter colored stone known as the Chilean variety

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TURQUOISE FOUND IMBEDDED IN A PIECE OF PARENT ROCK

This gem is found in the seams and pockets of alkalinic feldspar rocks and varies in color from sky-blue to green

Goddess of Mercy carved from Tibetan turquoise. It is about four inches high. Incidentally the same museum contains an egg-shaped topaz of an exquisite frigid light-blue color cut with four hundred and forty-four perfectly proportioned facets.

The lapis-lazuli of the man in the street is a coarse admixture of several minerals with head-ache producing names, but the true lapis is a stone varying from deep azure-blue to greenish azure-blue, the chief constituents of which are silica, alumina, soda, lime and small amounts of sulphur and chlorine. The color is due, in all probability, to the sulphur!

The gem is found rarely in crystals, but mainly in massive blocks. The oldest mines in which it was produced are in Afghanistan. Siberia is noted for the fine jewels it has contributed, and "Chilean" lapis, beautiful for its intermixture of blue and white, comes from the Andes Mountains, close to the Argentine border. Persia, Central Asia, Ontario, and Maine are other sources for varying qualities. Exceptionally fine lapis may cost as much as five dollars a carat. The average stone is worth about five dollars.

The luster of this December stone is glassy, and it ranges from subtranslucence to opaqueness. Its hardness is marked between 5 and 5½ on the Mohs Scale, and its density is about 2.4 that of water. Hydrochloric acid decomposes it somewhat to release small amounts of hydrogen sulphide gas.

Before the discovery of synthetic ultra-marine, fine lazurite was ground and used as a blue pigment. At that time the stone commanded a very good price, but now it is rated as a comparatively inexpensive gem.

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BIRDS THAT EARN THEIR HOUSE RENT

BY HIRAM BLAUVELT

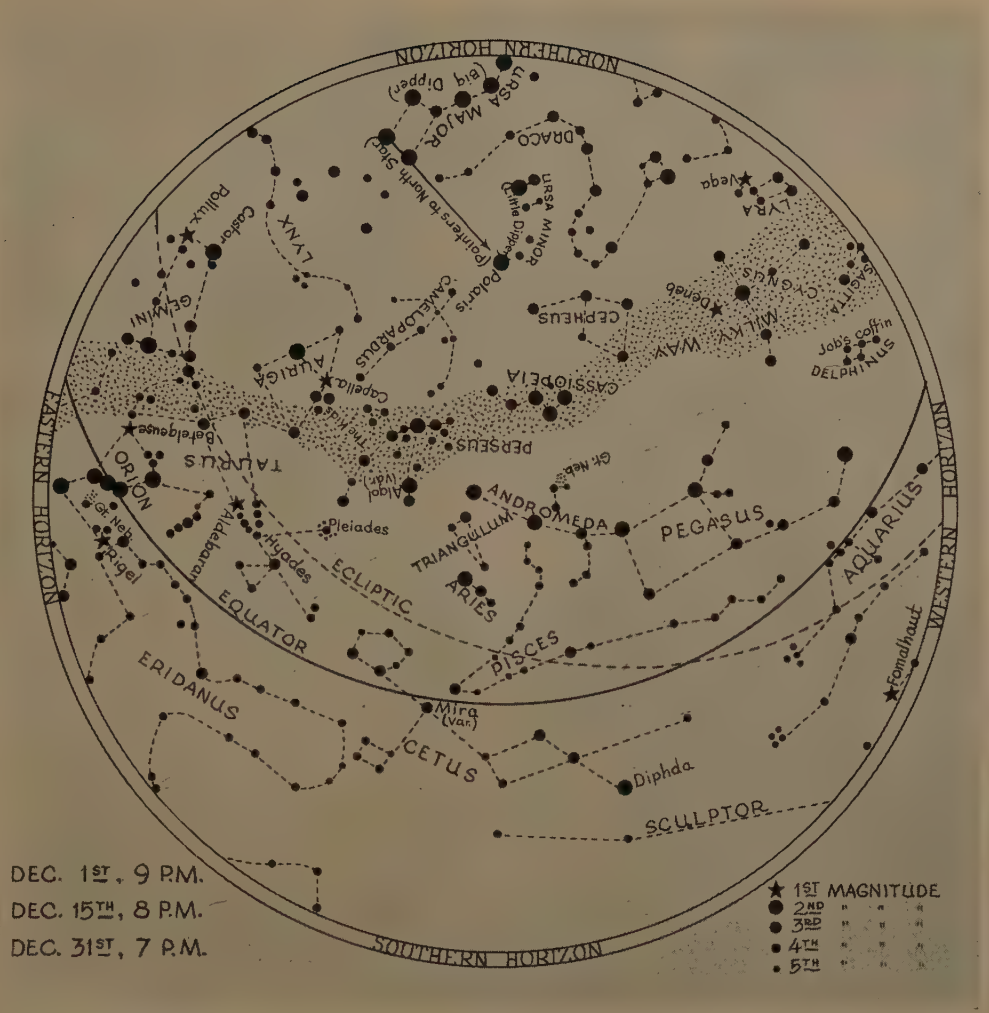
HOMES INVITE THE STARLINGS
Bird houses provided under the eaves of a German barn and on a pole in the field that the birds may be on hand to eat injurious insects

It is only during the past decade that we here in America have begun fully to realize the economic value of our birds. The countrywide movement to protect our song and domestic birds has been carried on by bird friends in the midst of a marked apathy of those who failed to see the tremendous and direct selfish interest which they, themselves, have to derive from our feathered insect-exterminators.

In this respect, German farmers and estate owners are distinctly advanced in their ideas. They look upon their birds as an economic asset, and in many cases do everything they can to encourage all kinds of birds on their places.

On a recent interesting trip through the peat moss fields, Herr Frans Mecking of Edewechterdamm explained to me that part of his farming policy was to encourage and foster bird life of all kinds on his farm. Whereas in America starlings are forced usually to hunt out their own nesting holes in isolated apple trees, telegraph poles and fence posts, in Germany a whole series of starling bird houses are erected on high poles right out in the middle of the field to encourage starlings to nest and breed there. This has changed nesting habits so that now starlings nest in colonies like swallows and martins, later gathering in huge flocks for feeding just as they do here with us. Mr. Mecking tells me there are certain types of grubs and insects against which spraying, dusting, or any other type of extermination is ineffective, but the birds do a good job of it, and those estates that do not have colonies nesting upon them suffer severely. They like the birds from a sentimental point of view, to be sure, but the practical use of them is far more important in killing the insect enemies of agriculture and allowing them to grow good crops.

This is the first time I have heard about birds being put on a business basis. German estate owners go to considerable time, work and expense providing bird-houses so that any energetic feathered tenant who likes the looks of the premises may come along and move in—rent free! The hungrier the bird is, and the bigger family the pair raises, the better the farmer-landlord likes it. Such a new and refreshing attitude speaks well for the future safety and housing conditions of bird-life in Germany. It is encouraging in our country too that almost daily our farmers and others are realizing that birds are not a sentimental luxury, but have a real "hard cash" value which is favorably reflected in the agricultural earnings and annual profit and loss statement of every farmer in the United States. There is certainly no better assistance our Federal Government can give the farmer than continued legislation protecting the best and hardest working little exterminators we have in our perpetual battle against the hungry insects preying on the crops.



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south

HOW TO RECOGNIZE THE PLANETS

BY ISABEL M. LEWIS

Of the eight major planets additional to our own planet, Earth, there are five—Mercury, Venus, Mars, Jupiter, and Saturn—that have been known to man from the earliest ages. The remaining three—Uranus, Neptune, and Pluto—have been more recently discovered. Uranus was found by Sir William Herschel in 1781. Neptune was discovered in 1846 as a result of a prediction based upon mathematical calculations made independently by Adams and Le Verrier. Pluto joined the planet family as recently as 1930 through a systematic search at the Lowell Observatory following a mathematical prediction made by Dr. Percival Lowell some years earlier.

Uranus is visible to the naked eye under favorable conditions as a faint, star-like object. One must know exactly where to look to distinguish it from nearby faint stars. Viewed through the telescope it is seen to have a perceptible disk, which is sufficient proof that it is a planet, because even in the most powerful telescopes the stars, due to their enormous distances, always appear as points of light.

Neptune, the most distant of the known planets until the discovery of Pluto, is never visible to the naked eye because it is equal in magnitude only to a faint, eighth magnitude star. The sixth magnitude is the faintest within the range of vision of the unaided eye. Yet Neptune also shows a noticeable disk when viewed telescopically.

The recently discovered planet Pluto is so faint an object, owing to its great distance from the earth and its small size—probably of the same order of magnitude as our own Earth—that even in a telescope as powerful as the 26-inch equatorial at the Naval Observatory at Washington it is difficult to detect it unless one is a skilled observer. It then appears only as a star-like object with no perceptible disk.

All the planets may be distinguished from the stars

by the fact that they appear to move among the stars. In the case of the planets nearest to the sun, Mercury and Venus, this motion from day to day is very rapid. Mercury completes a revolution around the sun in 88 days, Venus in 225 days. Even a most casual observer could not fail to note how rapidly these planets change their positions in the heavens. On the other hand careful measurements would be required to detect the motion of the planet Pluto in such a short interval as a day, for this planet takes more than two and a half centuries to complete one trip around the sun.

So in our attempt to know and recognize the planets from day to day we need consider only the five well-known naked-eye planets—Mercury, Venus, Mars, Jupiter and Saturn. Of these five planets, we will find Mercury the most troublesome. It is a planet that the eye may see only in the twilight. If one has a small telescope, of course, it is then possible to observe the brighter planets in daylight, and this is quite frequently done in the case of Mercury and Venus. To see Mercury, then, we must look in the eastern sky before sunrise when the planet is near its greatest western elongation, that is, at its greatest angular distance west of the sun, and in the west after sunset when it is near its greatest eastern elongation, that is, at its greatest distance east of the sun. One must know in advance when these times occur and one cannot expect to see Mercury for much more than a week before or after the date of elongation because the planet moves so rapidly that after that interval of time it will be too close to the sun to be visible in the twilight.

Mercury reminds us of the first magnitude star Vega, in brightness and general appearance, when seen in the twilight and one must not expect to see this planet except in the twilight. Its angular distance from the sun is never as great as thirty degrees and even under the most favorable circumstances it will never be as far as one third of the distance from horizon to zenith above the horizon and usually much less. Unless one is quite unresponsive to the beauties of the heavens he cannot fail to experience a thrill when he finds this beautiful little world shining brilliantly through the morning or evening twilight. An excellent way to identify this planet is to observe it for the first time when it is in conjunction with a known planet, preferably Venus or Jupiter, which are far more brilliant, or the moon. When one has once become acquainted with the appearance of Mercury it is much easier to identify it on future occasions. If one suspects he has observed Mercury, at a time when it is known to be near its elongations, he should look in about the same position on the following nights. If the observation was correct the planet's rapid change in position, and its disappearance in the rays of the sun within a week or so, will confirm the fact that the observer was right.

Venus one can hardly fail to recognize. It is by far the most brilliant of all the planets. Like Mercury it appears only in the eastern sky before sunrise or in the western sky after sunset, but it departs to a much greater distance from the sun than Mercury. It is a dazzling white in color and may be quite easily distinguished from its nearest rival in brilliancy, Jupiter, by its superior brightness, its color and its motion. Jupiter is yellowish in color and its light is remarkably steady. It has been said that the planets may be distinguished from the stars by the fact that they do not twinkle or scintillate in brightness. This is not entirely true. When a planet is near the horizon there is an occasional twinkling due to the unsteadiness of the atmosphere at low altitudes. Mercury, in fact, is never seen at high altitudes and has been called "The Twinkler," and one speaks of the "sparkling" brilliancy of Venus.

Jupiter, however, even when near the horizon, shines with the same steadfast, yellow light that is one of the most impressive characteristics of this planet. When near opposition and on the meridian at midnight it is quite superior to Sirius in brightness, but, on the other hand, when it is farthest from the earth Sirius slightly outclasses it in brilliancy. It is always far inferior to Venus in brightness. After one has once become acquainted with these two most brilliant of the planets one would never mistake one for the other so different are they in color and general appearance. In the telescope, of course, there is no comparison between the two planets. Jupiter will have its four historic satellites and its belts to reveal its identity, and Venus will exhibit phases like the moon.

Saturn we will soon learn to recognize readily enough. It ranks among the first magnitude stars in brightness, noticeably inferior to Sirius and Canopus, but comparable with Capella or Altair. Since it takes nearly thirty years to make a trip around the sun it does not move far among the zodiacal constellations in a year, staying a year or more in one constellation, retrograding or moving westward very noticeably at times as a result of the relative effect of its own motion and that of the earth, an effect that is noticed in the case of all the planets. Saturn has been described as leaden in color, but it is rather white, slightly tinged with yellow, similar to Procyon in general appearance. As this year it is in the southern zodiacal constellations of Sagittarius and Capricornus we have seen it at its best in the summer months. It will gradually move eastward from Capricornus into Aquarius within the next few years.

Mars we can always recognize at once by the decidedly reddish color which distinguishes it from all other planets. It comes to opposition on alternate years and its distance from the earth varies from about 35,000,000 miles, at a close opposition, to more than 62,000,000 miles at a distant opposition. Thus its brightness varies greatly at different oppositions. Its most favorable oppositions come at intervals of seventeen years. The last occurred in August, 1924. Then, for a short time, Mars surpassed Jupiter in brightness. Mars will next come to opposition on March 1 of next year. It will then be 62,680,000 miles from the earth at closest approach and its magnitude at that time will be almost exactly the same as that of the second brightest star, Canopus.

Mars is now in Leo and rises before midnight. It is some distance east and a little (Continued on page 300)

NATURE RAMBLES WITH UNCLE DICK

A DEPARTMENT FOR THE YOUNG FOLKS

• • •

JEWELS OF THE STORM

BY UNCLE DICK

DID YOU know that there are jewels in the snow storm? Well, there are—more jewels than any store can have in its glass cases. And they are so different, one from another, that hundreds of pictures have been taken of them and a great, beautiful book full of them has been printed.

But these jewels do not last. A breath of warm air and they are gone, leaving only a lovely memory. These jewels are the flakes of snow that drop gently down, or are tossed on the wind of a winter storm. When you make a snow ball you are packing thousands of them together. When you build a snow man his body is made of millions of white jewels.

Would you like to see these for yourself the next time it snows? You can do it. Ask your mother for a piece of dark cloth—black velvet is the best—and stretch it on a piece of board. Then get a broom straw, or a hen or goose feather. The only problem now is a microscope or a magnifying glass. A microscope is best, although it does not need to be a big or expensive one. You will have to fix up the glass, if you use one, so that you will not have to hold it. You will need both hands free to handle your snow jewels.

With these things ready on a window sill, and a cap and sweater on so you won't get a cold at your adventure, raise the window. With the end of the broom straw capture a snow flake. Put it under the center of the microscope or glass. If it does not lie flat nudge it with the feather. Then look. But don't look at just one flake. Capture another and another.

I won't and couldn't tell you all you will see, but here are some of the things to look for. You will see that there are two sorts of flakes. Some will be like tiny pieces cut from a stick of candy. These are called columnar flakes. Others will be little, six-sided tablets. These are called tabular flakes. In fact, it is these

THESE ARE THREE DIFFERENT KINDS OF SNOW FLAKES THAT NATURE HAS MADE AS THE RAIN HAS TURNED INTO SNOW AND DROPPED SWIFTLY DOWN TO MAKE GOOD COASTING FOR YOU GIRLS AND BOYS

lovely tablets that you will enjoy the most. Hardly any two that you will pick up may look alike as they glisten against the black velvet. You will find designs that you will wish to copy. But you will have to be quick to get a picture of them on your mind before they vanish. One man spent his whole life taking pictures of the snow flakes.

As you look at these beautiful flakes, one after another, you will know that Nature that day has been busy making something very lovely. It is only a snow flake, just one of a tremendous swarm that come drifting down to make good coasting and snowshoeing. But if you will follow my advice and spend some time looking at some of these flakes I am sure that you will have even more fun when you go coasting, surrounded by banks of jewels.

• • •

RAISING ROBINS

BY MINNIE WATSON KAMM

IT HAD been a long, cold and hard rain. As soon as it stopped the boys were out in the yard. Under the elm they found three sad and cold little robins. The rain had melted the mud in their nest. The wind had torn it loose. We brought three little birds into the house and laid them in a warm cloth. They half opened their eyes. Ah, there was hope. We worked with them. We drove the little black pests from their bodies. Soon the little fellows began to stick out their necks and look around. So we brought in the nest, patched it up and hardened the mud. We planned to put it back in the tree. When the mother and father bird came for their babies they would find them safe.

All day we tried to find the two parents. But no robins were about looking for their family. There was nothing to do but to take their place. So a home was made in a pasteboard box in the kitchen. Lunch was served. It was bread soaked in warm milk. The babies took one taste and would eat no more. So the boys went digging worms. These went down the yellow throats with no argument. But one little bird could not reach as high as the others. We found that one of his legs was broken. So we fixed it as best we could and always fed him first. Besides his bad leg he was smaller. So we called him Runt.

Runt's leg healed and soon he was able to stand, although one of his toes was never quite right. All three birds grew pin feathers in place of down. They began to stretch their wings and legs. They kept us busy getting worms for them. But they always took only one bite of bread and milk no matter how hungry they were.

After they had been members of the family for three weeks the birds began flying about the house. They perched on picture frames, backs of chairs or on one's head. As the supply of worms grew less we cut liver into strips like worms. All three liked this. It took three or four strips of liver three inches long to make them stop asking for food. But when they had enough they knew it.

By now it was time to take them outdoors where they belonged. We did not want them to grow up in the house. We wanted them to learn how to care for themselves outdoors. So we would take turns as robin-tender. We let the three find ants and bugs on the ground. They found berries and ate them. For a while they all wanted liver to add to the meals they had gotten themselves. The two larger birds learned how to care for themselves soon. But Runt would come to the screen door and tell us that he was hungry.

At night we would easily catch all three and put them to bed in a basket in the hall. They were now about ready to move out of a man's house into one of their own. So we nailed a house for them inside the garage and put them in it every night. They soon learned that this was their new home. Still they would answer our call. When we went into the garden they would fly to perch on a head or shoulder. They were glad to see us.

After six weeks the two strong birds seemed to

go back to the wild. But the Runt still was friendly, although he would not eat worms we dug for him. He wanted to dig his own. He never did get a good coat of feathers and he was smaller than his brothers.

About this time the family left on a vacation. One member came back after two days. He called the birds. Only Runt answered. When we all came back Runt was gone and the other two birds could not be told from other young robins around the yard.

"Well," said one of the boys, "next year let's get some more baby robins and raise them."

"No, son," said his father, "but we will keep our eyes open for any fallen nests and perhaps we can help another family grow up."

• • •

A STRANGE BIRD—THE PELICAN

PROBABLY you have heard the little verse about the pelican. It tells about his bill which is the largest part of him and which is supposed to hold a lot of food. But it is an interesting bird in other ways.

This month the artist has painted a beautiful picture of pelicans. This picture is on the front cover and on this page is an outline of it in black and white. Now one of the tests of a bird lover is how well he or she can observe. When you see a bird can you remember the different colors and just where they are on the bird? Can you remember these long enough to get home and look it up in a bird book? Try and see how good your memory of color is by using the colored picture on the cover and the outline on this page. Take a good look at the cover. Let the colors paint themselves on the mind of your eye. Then see whether you can color this picture with the same colors as are used on the cover.

What other things are suggested by the cover picture? It should tell you that the pelican lives in warmer climates. Why? Because you see palm trees in the background. It should tell you that the pelican is a fisherman. Indeed, he lives on fish. That is why the two birds are shown perched on a limb out over the water. Their eyes are brightly watching for a jumping fish or one that is just below the surface of the water. That fish means dinner.

You will find some more about pelicans in the small colored pictures that you will find elsewhere in this magazine.

SPYING ON PARTRIDGES

BY RUSSELL M. CORYELL

Once, when I was eleven (and that's thirty years ago) I stumbled and fell at the foot of the stump pictured above, and there discovered my first partridge nest. My brother took the picture of the eggs after hatching.

Hoping to see the baby chicks, I had visited the nest daily and was greatly disappointed to find only the neatly decapitated shells. Since that date I have found perhaps half a dozen other nests and always tried to see the baby chicks—and always been outwitted. This last summer, however, by getting up at six one morning, I came upon a nest of eight eggs which I had been watching. Six of the chicks were still wet.

I called the clans. To our surprise the baby chicks made no attempt to hide despite the anxious cries of the mother grouse out in the undergrowth. Instead they came scrambling out of the nest and climbed upon our knees, peeping so faintly that we had to put our heads down close to be sure whence came the sound.

The children were anxious to see the remaining two eggs hatch. So were the grown-ups, and as we were all of us of the opinion that the chicks themselves pecked their way out and that the two eggs in question were so mature that we need not fear cooling them too much by keeping the mother off, we sat for perhaps twenty minutes watching—the baby chicks meanwhile nestling contentedly against us. After a time, however, upon picking up one of the opened eggs I noticed that the broken edges of it (and all the others) were all pressed inward instead of outward. It appeared from that that it might be the mother grouse who did the pecking. Anxious to see if that were the case, we all withdrew to an ice-house conveniently located within fifteen feet of the nest. Climbing up into the ice-house and peering cautiously out a back window, we could watch without being seen.

The mother bird scarcely waited half a minute after our supposed departure before she came clucking back through the woods. She approached warily, nevertheless, looking in all directions and apparently walking aimlessly here and there on all sides of the nest before she finally settled into it.

I omitted an important point. When we left the nest to hide, we put all the chicks back into the nest. They at once scrambled out, however, and followed us for at least half the distance to the ice-house. They were still out when the mother returned. She clucked coaxingly and after perhaps ten minutes, one at a time, the chicks went back.

I should say that fifteen or twenty minutes had passed when suddenly the mother hopped out of the nest and, with spread tail, began clucking. It looked as if she were coaxing them out to follow her, but before any chick left the nest a hawk swooped down through the pine trees directly for the nest, or, possibly, the mother. It was within three feet of the nest and perhaps two of the mother when I shouted.

The hawk swerved and lifted into the air, taking a perch on a tree not more than fifty feet away. He seemed not at all afraid. I think he hadn't seen us at all but simply been startled by my cry. The mother grouse, meanwhile, stood frozen like a statue beneath some low bows. Chicks were absolutely still. Things remained like that for several minutes until my brother climbed down and drove the hawk away. Incidentally he drove the grouse away also.

We waited three quarters of an hour for the mother to return, then decided that having discovered our presence she would not do so. The clan departed, leaving me alone in the ice-house. The mother grouse evidently could not count, for she accepted the departure of the clan as a sign of retreat of the entire party. She had evidently been watching from near-by, because within twenty seconds she was back on the nest. She remained there for three quarters of an hour, when once more she hopped out, spread her tail, raised her ruff a little and clucked invitingly. One at a time the chicks left the nest until five were out and scrambling inexpertly after the mother. At a distance of perhaps fifty feet from the nest she crouched under a bush and waited for the stragglers to catch up.

At that point, my brother and two children returned. The grouse and chicks froze in the bushes. I asked my brother to examine the nest to see whether the two eggs had been hatched and why the sixth chick had not followed. He reported the chick dead and the two eggs still unhatched. Thereupon I, too, descended and after consultation decided to open an egg with my knife. It was sweet smelling but entirely liquid. There was no indication of what had killed the baby chick.

While we were sitting about the nest, the mother grouse became nervous and ran squealing as if in agony off into the deeper woods. It was doubtless intended to draw us after her away from her five chicks who were forty feet or more away from us. It had a curious effect, however. We did not follow her but the baby chicks decided to come to us. One at a time they came back from their hiding place peeping eagerly and snuggled contentedly against us.

I have read other accounts of finding baby chicks in the woods when out foraging with the mother (and come upon them myself, in fact) and in every case the little ones took immediate shelter, hiding most cleverly and maintaining perfect quiet. The only explanation for the confidence of these chicks in us seems to be that we found them still wet from their eggs, as yet untaught by their mother, and willing to trust the first "grown-ups" that had come into their lives.

When we left them we had to hurry away because they were determined to follow us. In fact we were rather disturbed at first for their safety, but when at a distance of a hundred feet or more from where we had left them we could hear the clucks of the approaching mother.

The same day marked the finding of a humming-bird's nest.

MIKE

Lifer Wins Prize

The Massachusetts Society for the Prevention of Cruelty to Animals asked the question, "What is the most intelligent thing your cat, dog, horse or other animal ever did?" The society offered prizes for the best brief essays in reply. Second prize was awarded to Frank Stevens who is serving a life term in the Massachusetts State Prison at Charlestown. Stevens' essay follows:

"Work for Mike begins when the men are locked in for the night. Silently, unobtrusively, he makes his nightly rounds of the wing. If you are reading or writing, Mike won't interrupt you. But if you are pacing your cell, or sit nervously on your bed or chair, Mike stops at your door, looks thoughtfully up at you. You cannot resist his silent appeal to forget your worry or heartache and scratch his head or side.

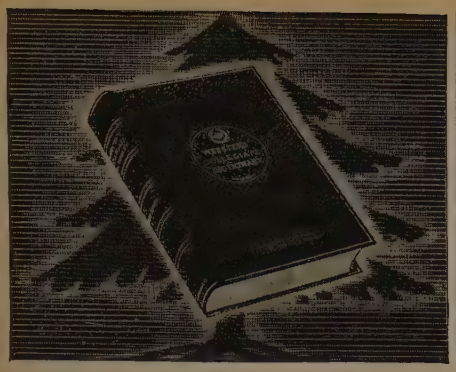
"But no pet names, mind you, like 'Kitty' or 'Puss.' Just, 'Hello, Mike'—man-to-man fashion—for this is serious work between two men.

"Your next thought is to feed him. A scrap of meat, even a piece of bread. He'll make a great show at eating it—the overfat rascal—then lick his chops and press against the bars for his farewell scratch.

" 'Good-bye, Mike,' you say, and smile softly. From farther down the tier comes, 'Hello, Mike.' And you smile again. Mike is on his errand of mercy."

National Pet Show

For the first time poultry, including bantams, water fowl, turkeys, pheasants and other breeds, will be included in the National Pet Show which will be held for the fourth year in Madison Square Garden, November 22 to 26. This show has become an established event and last year drew 75,000 visitors.



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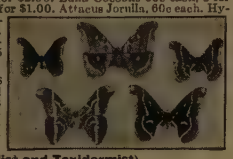

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DON Q.
1925-1932

Don Q. has passed away. Known to thousands in person or in picture, this jaunty little California quail, whose whole life has been spent with human beings, died in the home that he has shared for seven and one-half years with William L. Finley and his family at Jennings Lodge, Oregon, on October 13. His life was a unique and happy one. Lost from his mother when but a day or two old, he was nurtured to full quailhood by the Finleys. He has travelled from Oregon to Princeton, New Jersey, and back again. Now he has gone to that place where good animals go to join the mother he scarcely knew. Mr. Finley writes:

"For some time he has had a large tumor growing on the upper part of his leg. We tried a doctor, but he couldn't seem to do anything to help. We let him out in the garden each morning. He always stayed around in one place and answered every time we called him. About five o'clock last evening, when I went out to get him, he didn't answer and I looked in his accustomed place and he had passed away. His feathers were all smooth and he apparently hadn't struggled any. He must have suffered some during his sickness, but he never showed it, always being cheerful, although he had great difficulty in walking. It's sad to have him go, as he was a wonderful pet."

So no longer will Don Q. fight shiny tan shoes. No longer will he roost atop the curtain rod in the Finley study. No longer will he roam the Finley yard and sleep in his comfortable little house by the French doors. He will be missed, as all those we love and understand are missed. But he leaves behind the memory of a friendship between man and a wildling that is rich in beauty and significance. May you rest in peace, Don Q.

Red Admiral Butterflies

Mrs. H. P. Cook, of Anderson, Indiana, writes that on September 5, 1932, her son, while driving near Springport, Indiana, encountered so huge a flock of Red Admiral butterflies that he had difficulty in guiding the car. For a half-mile the swarm continued to pass. The Red Admiral is one of the most widely distributed of butterflies, being abundant in North America, northern Asia, Europe and Africa. The larvae feed mainly on the leaves of nettles, plants that are well protected by their stinging hairs, and have been able to spread widely. The insect raises at least two generations each season, and some of the individuals of the later brood hibernate as chrysalides, while others pass the winter as adults. This versatility of habit, the abundance and wide distribution of its favorite food plant, and its propensity to migrate when favoring conditions give rise to hordes, all help the Red Admiral in its ambition to possess the earth. Perhaps it is fortunate that certain tiny insect parasites keep pace with the increase of their host, and serve as checks on what might otherwise prove a devastating abundance. So with these butterflies, as with other forms, Nature provides a way of keeping life within a proper balance.

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A Zoology Text

In his preface to *An Introduction to Zoology,* its author, Dr. Z. P. Metcalf, says, with reason, that he who brings out a new zoology text these days must needs justify himself in adding to already existing literature. Dr. Metcalf is amply justified, and his right to add this volume to the list of zoology texts lies in his method of approach, a method that is altogether interesting, logical and stimulating. In his preface Dr. Metcalf says:

"For a good many years the writer has believed that students should be introduced to their beginning course in zoology through a study of the vertebrates with especial reference to the mammals. The reason for selecting this method of approach is based upon these facts: the student is interested chiefly in the vertebrates, is more or less familiar with much of their natural history, and is not entirely unfamiliar with their anatomy and physiology, especially that of birds and mammals. In addition to a thorough study of the vertebrates from the standpoint of anatomy and physiology, the animals should be studied from the viewpoint of their relations to man. The whole course is thereby vitalized, and interest is not hard to maintain."

We feel that Dr. Metcalf has admirably achieved his objectives in this volume and that it is a distinct addition to textual material in this field. The publisher has done an excellent job, also. He is Charles C. Thomas, Springfield, Illinois. The price is $3.50.

Plant Clinic

Under the direction of Dr. Louis O. Kunkel, the Rockefeller Institute for Medical Research is now carrying forward work in its new department of plant pathology at Princeton, N. J. The new department is housed in a specially constructed laboratory and greenhouse plant. Extended studies of diseases affecting botanical life will be carried on.

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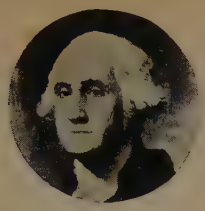

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About House Plants

Many are those who despair of consistent success in growing house plants and these will welcome the little book, *Success with House Plants,* by Jane Leslie Kift and Karin B. Hedenberg. In this handy little volume they should find the answer to their past failures. The authors cover plants suitable for different exposures, bulb culture in the house, cactus and other succulents for indoor purposes, insects and diseases of house plants, the miniature greenhouse, aquarium plants and after care for Easter flowers. It is a mighty useful and handy volume. It is published by A. T. de la Mare Company and sells for seventy-five cents at the book store or eighty-five cents, postpaid.

For the Gardener

Many garden lovers are acquainted with the horticultural writings of Louise Beebe Wilder, whose books and magazine articles have been both numerous and widely published. They will be glad to hear of another garden volume from her pen, this one entitled *The Fragrant Path.* The author devotes this volume to the flowers and leaves that are distinguished by the sweetness of their scent. She has gathered together an amazingly complete description of our fragrant plants, and she writes about them with that full knowledge of their odor born of a lifetime of gardening. Here are found myriad suggestions for the gardener who seeks something different and interesting. Here also are many stories of the history of plants, providing fascinating reading. With all the garden books now available it is quite a trick to produce something different and Mrs. Wilder has turned the trick. The publishers are the Macmillan Company and the book sells for $3.

Nature in Autumn

The third of a quartet of Nature books by Oliver P. Medsger has come from the presses of Frederick Warne and Company, New York, under the title of *Nature Rambles: Autumn.* Its two predecessors, as may be suspected, have been devoted to rambles taken in the spring and in the summer, while the fourth volume in this group is being prepared and will complete the seasons with stories of winter rambles. Mr. Medsger's style is that of a naturalist companion accompanying you on a ramble in the outdoors. His eyes and ears attune to what is going on in the wild world about you as you walk, he introduces you to many things of great fascination, things you otherwise would pass by unnoticed and unappreciated. To read his book is to have a more delightful autumn ramble. Physically the book is enhanced by the inclusion of sixteen color plates and many black and white illustrations. This volume, as with the others in the group, sells for $2.

We Blush

Sadly we confess to an error in the caption beneath the mushroom picture on Page 160 of our October issue. We called the mushrooms pictured "Hypholomas". They are *Tricholoma personatum.* Both are edible, so no stomach aches could possibly have resulted from this error.

The Living Gifts for Christmas

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As a perfect gift for one who likes to garden, we recommend the Gardeners' Chronicle, the monthly magazine that covers every phase of garden activity. It is timely, authoritative, and interesting to read. The subscription rate is $2.00 a year—two gift subscriptions cost only $3.50, three or more $1.50 each.

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SECRETS OF HUNTING WITH A CAMERA

(Continued from page 276)

free, but the camera—relegated to a special back pack—must be not too hard to get at. A small movie camera will fit into any pack, but most cameras are both heavy and angular. They weight down a pack and dig into the spine, so that a padded board for insulation may be worth its extra weight. All such articles should be tried out first at home.

It is because of the weight and bulk of cameras and film that more attention has to be given to the camp equipment than would ordinarily be required for a mere sight-seeing trip. Tents, sleeping bags, and extra clothing all have to be reduced to make room for the photographic equipment. Everything has to be laid out and bundled well in advance of starting on any trip, so as to be sure that each necessary article can be gotten in. There are such emergency needs as a light-proof changing bag, in case the film jams some day, a pair of pliers, a small screwdriver, camera oil, and a dozen other odds and ends for repairs. What will happen to the cameras in case of a sudden downpour of rain when we are far from camp? There my umbrella blind has served a double purpose more than once. Is the tent space large enough not only for the members of the party, but also for the cameras and all film exposed and unexposed?

Planning a camera hunting trip would be an onerous task if it were not so much fun. When you see a man at home on a winter evening tying flies, you know that he is a fisherman. When you see a man tinkering with all sorts of queer devices, he may not be an inventor—maybe he is only a camera crank. And, as for me, I take every trip and enjoy every possible experience at least three times over—once in advance, once in fact, and many times afterwards when the film comes out of the developer or back from the laboratory and has to be edited, spliced, printed, enlarged, or what you will. Our friends tolerate the eccentricities of a hobby, but they, too, get the thrill when we bring back not just a head or a set of horns, but display for their benefit each significant detail, each mounting thrill of a month on the trail.

Notes About Birds

Harry L. Rhodes, Kansas bird lover and lecturer, has put together an interesting bird book under the title of *Bird Notes*. It is a book for the lay observer who wants some informal information about the birds he sees in his yard or on a walk in the country or at his feeding stand. This the author supplies in brief, page-long notes accompanied with a black and white illustration. This done he proceeds to a lot of interesting questions and answers about birds generally and specifically, their habits, their value and their variety. A section devoted to birds and trees is particularly interesting, and the book ends with a chapter on bird sanctuaries and an excellent index. The book is illustrated by Margaret Whittemore and, in fact, she is likewise the distributor of the volume. A check for $1.50 sent to her at 1615 College Avenue, Topeka, Kansas, will bring, in return, a copy of *Bird Notes*.

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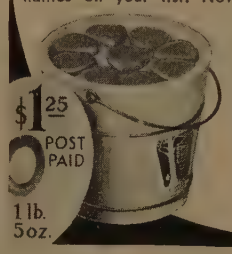

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Or, if you prefer, to your local resident officer. Gifts may be allocated to any specific purpose or district

HOW TO RECOGNIZE THE PLANETS

(Continued from page 290)

south of Regulus, which it surpasses noticeably in brightness. All astronomers who are interested in a study of the surface markings of this mysterious little world, which may be inhabited, will soon be preparing to make observations of the planet as the time of its opposition draws near.

Mercury passes into the morning sky on December 4, when it comes into conjunction with the sun. It will be at greatest western elongation on December 23. It will then rise in the southeast about two hours before the sun and may be seen for a few days before and after this time.

Venus is still a fine Morning Star. On Christmas Day both Mercury and Venus will come into conjunction with the crescent moon, both planets being nearly seven degrees north of the moon at the time of conjunction. This will be a fine time to hunt for Mercury in the morning twilight. It will then be some distance northeast of the moon, however, as the conjunction occurs some hours later.

Jupiter is also visible in the morning sky this month and on December 14 is in quadrature, or ninety degrees west of the sun. It will, for that reason, be due south at sunrise. It is not far distant from Mars and to the southeast of it. After that date it will rise before midnight at an earlier time each night.

Saturn is the only planet now visible in the evening sky. It is in Capricornus and sets about three hours after the sun in the southwest.

December evening skies are always brilliant, especially in the East. Orion, the finest of all the constellations, is now well in view in the southeast, and to the northwest of Orion are the Pleiades and the Hyades in Taurus. Gemini is also visible in the northeast and the Dog Stars, Sirius and Procyon, are coming into view above the eastern horizon.

The Southern constellations are not conspicuous at this time of year. Aquarius, Cetus and Eridanus, which now fill most of the southern sky, are all large but not striking constellations as they contain so many faint stars. The first magnitude star, Fomalhaut, will soon disappear below the southwestern horizon. It is visible in our latitudes only a short time in fall and early winter.

Perseus, Andromeda, and Pegasus fill most of the space overhead and due west, and Cassiopeia is now nearly on the meridian above the pole. The Big Dipper is not conspicuous at this time of year in the early evening as it rests nearly on the northern horizon.

Auriga, north of Orion, is one of the finest of the winter constellations. Its brilliant, yellow, first magnitude star, Capella, equals Vega in brightness and is one of the finest stars of the northern hemisphere. It will be conspicuously in view in the evening hours from now on until late in the spring.

The shortest day of the year will occur on December 21 when the sun will cross the equator going south at 8:15 P. M., Eastern Time, and winter will commence in the northern hemisphere.

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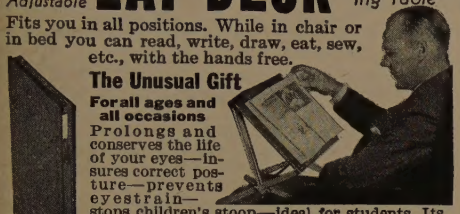

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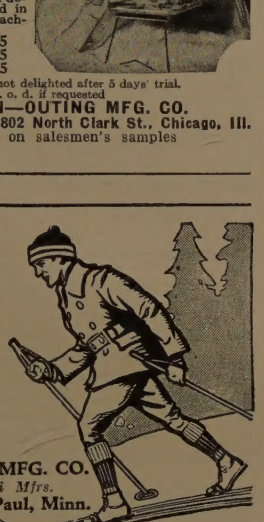

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SWARMING OF ANTS

BY JOHN H. FURBAY

On Sunday afternoon, September fourth, 1932, as I was returning from a walk in the country, I noticed several winged ants, *Tapinoma humilis,* in the air. By the time I reached home, there were great swarms of them everywhere. I examined my front lawn, and found great excitement among the ant colonies. Workers, winged queens and winged males were running here and there around their entrances. The entire lawn was a seething mass of ants. The winged forms were rapidly leaving the ground, and taking to the air.

On my coat I found many males apparently exhausted and unable to fly away when I tried to shake them off. They had mated with some flying queen a few minutes before, I assumed. Before an hour had passed, I noticed numerous males on the ground, helpless, and apparently dying. Some were being dragged away by workers which appeared to be attacking the males as though helping to kill them.

By the end of another hour there were many mated queens crawling about on the ground and on the grass blades. As I watched them, I found several in the act of tearing off their own wings. They had evidently mated while in flight, and were now ready to settle down to their business of rearing a family. Soon there were countless queens stripped of their wings crawling about everywhere, seeking new homes. There were also many queens which did not tear off their wings.

As darkness approached, the air cleared up, and no more flying honeymoons were in evidence. The excitement of the colonies was dying down, and the queens were disappearing in various crevices and holes. There were still many males crawling about in a semi-stupor. A careful look over the surface of the ground revealed hundreds of delicate wings which had been shed by the mated queens. As darkness fell, all was again quiet.

My attention was first called to the flying ants about three o'clock in the afternoon, Central Standard Time. Their numbers seemed to be greatest between four and five o'clock, and by six o'clock, the affair was waning. By seven-thirty, all was quiet.

I inquired to find out whether this swarming was very extensive, and learned that it covered most of this state as well as adjoining states. I do not know how much farther it extended. Tourists stopping at the gasoline stations that same evening reported having driven through swarms of them for several hours over a distance of a hundred miles or more.

The next morning I examined my lawn again, and found no indications of the previous day's rendezvous, aside from the many wings scattered about like the remains of some aeronautic battle. A few wingless queens were found, and a number of dead males were uncovered. The workers had apparently cleared away the debris as much as possible. All was peaceful and industrious. Life had once more settled down to routine matters.

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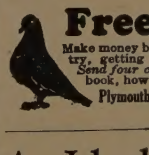

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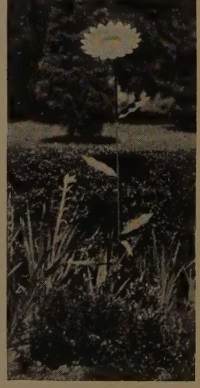

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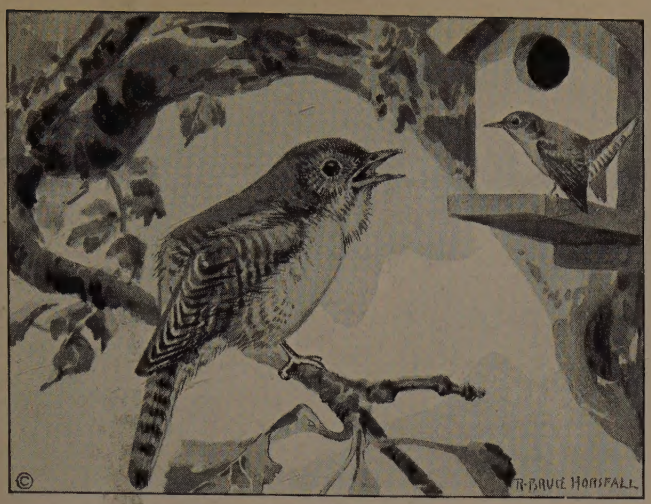

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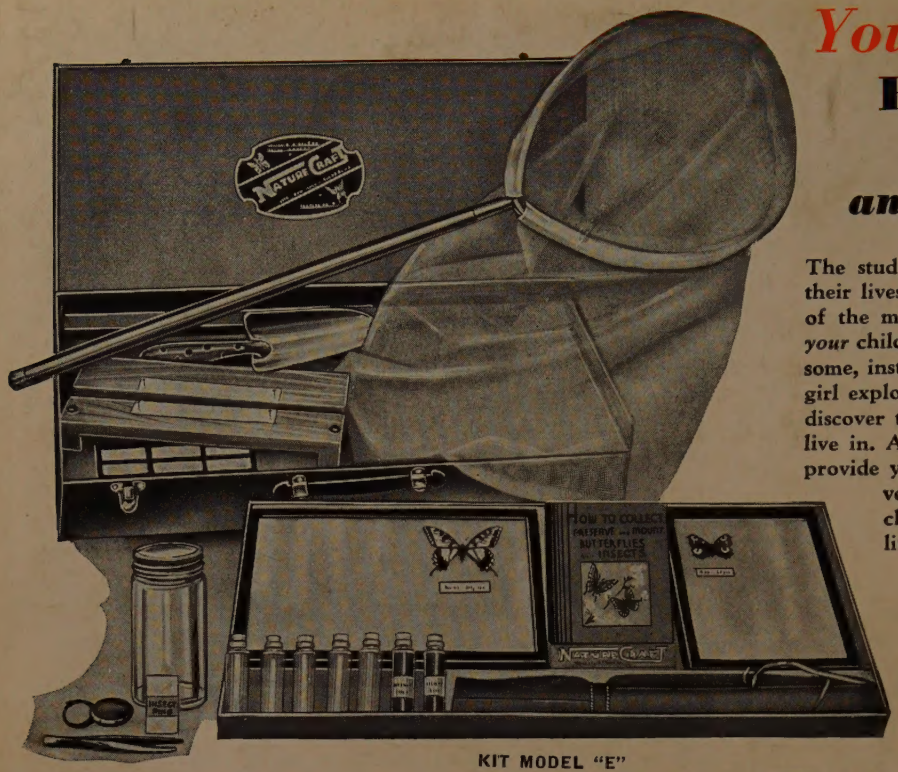

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